Conference Report

On

Conversion To The Metric System

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Alberta
EDUCATION
1975

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AN ALBERTA EDUCATIONAL CONFERENCE REPORT

on [redacted]

CONVERSION TO THE METRIC SYSTEM

Held at:

Alberta Vocational Centre

Edmonton, Alberta

October 17-18, 1973

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Foreword

The Alberta Education Invitational Conference on Conversion to the Metric System was implemented, having in mind the following objectives:

(a) To provide a means of communication among and the provision of information to, policy level educational personnel in the Province of Alberta elementary and secondary school systems and teacher training institutions, with respect to metric conversion in the schools, and,

(b) To provide a context for discussion regarding the generation of policy alternatives and strategies related to the issue of conversion to the metric system as it impinges upon elementary and secondary education in Alberta.

The Alberta Department of Education gratefully acknowledges the participation and efforts of the conference planning committee, and the conference participants, in recognition that any measure of success of the conference was due to them.

Special appreciation is expressed to those guest speakers, discussion leaders, and others, whose special efforts contributed greatly to the two days. In addition, thanks is expressed to the Alberta Vocational Centre, Edmonton, for the use of their fine facilities during the conference.

It is hoped that this report of proceedings will provide a fitting culmination to an activity which has, in the recent past, sparked considerable action at various levels of administration of elementary and secondary education in Alberta.

ALBERTA EDUCATIONAL CONFERENCE ON CONVERSION TO THE METRIC SYSTEM

Alberta Vocational Centre
10215 - 108 St., Edmonton
October 17 and 18, 1973

Wednesday, October 17

8:00 - 9:00	Registration
9:00 - 9:30	Introductory Remarks - Conference Chairman - E.A. Torgunrud, Director of Curriculum Welcome to Delegates - J.S. Hrabi, Associate Deputy Minister, Department of Education Announcements
9:30 - 10:45	S.M. Gossage, Chairman, Canadian Metric Commission Address: *Conversion to the Metric System on the National and International Scene*
10:45 - 11:00	Coffee
11:00 - 12:00	Miss Claude Chapdelaine, Canadian Metric Commission - Liaison Officer with the Curriculum Committee, Canadian Council of Ministers of Education Address: *The Present Status of Conversion to the Metric System in Canadian Education*
12:00 - 1:30	Lunch
1:30 - 2:30	T. Vant, Chairman, Government of Alberta Inter-departmental Committee on Conversion to the Metric System Address: *The Metric System: Current Status in Alberta*
2:30 - 2:45	Coffee
2:45 - 4:00	S.A. Lindstedt, Faculty of Education, University of Calgary Address: *Curricular Implications of Conversion to the Metric System* Reactors: J.H. Jeffrey, Alberta Department of Education L.W. Turner, Alberta Chamber of Commerce Mrs. D.G. Agar, Alberta Federation of Home and School Associations
4:00 - 4:30	G.B. Hawley, Department of Education *Summary and Implications*

Thursday, October 18

9:00 - 9:15	Announcements - Assignment to Groups
9:15 - 10:30	Groups A_1, A_3, B_1, B_3, C_1, C_3, D_1, D_3, E_1, and E_3
10:30 - 10:45	Coffee
10:45 - 12:00	Groups A_2, A_4, B_2, B_4, C_2, C_4, D_2, D_4, E_2, and E_4
12:00 - 1:30	Lunch
1:30 - 3:30	Plenary Session
	Group Reports and Recommendations
	Conference Summary

Introduction

Gene Torgunrud, Conference Chairman

Welcome to the Alberta Educational Conference on the *Conversion to the Metric System.*

We have a number of guests to be introduced. We are very fortunate to have with us Mr. McArthur, who is the provincial representative or commissioner on the Metric Commission for Canada. We have representation from the Home and School Federation, from Indian and Eskimo Affairs and from the Commission. We also have some observers from the Provincial Program on Articulation here in the province, the Department of Advanced Education, The Alberta Teachers' Association, the University, the Trustees' Association, and the Department of Education itself.

It is our hope that in the exchange that occurs from this group, we may receive some policy and principle direction for action which we might take regarding the conversion to the metric system in this province.

Welcome to Delegates

J.S. Hrabi, Associate Deputy Minister
Department of Education

Metrication, as we are all aware, is a matter of growing public interest. I understand that this conference has two objectives. The first objective is one of communication, while the second objective of the program is in any recommendations that might come forward from this conference with respect to policies at the provincial level, to strategy at various levels, and to any timeline appropriate to circumstances that we find ourselves in today.

Mr. S.M. Gossage

Mr. Gossage was appointed chairman of the Metric Commission in 1971. He came to this position very well qualified, having spent some five years as vice-president of the Canadian Pacific Railway Company, as well as member of and director of the executive committee.

Mr. Gossage originally hails from England where he was born some 67 years ago. There he attended the famous Rugby School and later the University of London where he obtained his Bachelor of Science and Engineering. Following that he obtained his Master of Science from Yale University on a Strathcona Scholarship in transportation.

He commenced service with the Canadian Pacific Railway Company in 1926 as a freight shed employee at Trois Riviere, Quebec. He rose through the ranks holding various successive positions until his election to the vice-presidency and executive council in 1966, a position that he held until his retirement.

Among the clubs of which he is a member are the University Club in Montreal, the National Club in Toronto, and the Canadian Railway Club. He is also trustee of Bishop's University in Lennoxville, Quebec.

CONVERSION TO THE METRIC SYSTEM ON THE NATIONAL AND INTERNATIONAL SCENE

S.M. Gossage, Chairman, Canadian Metric Commission

One of the basic questions you can ask is why are we considering metric conversion? A short answer to that is, we are considering it because it is inevitable. And if it is inevitable, conversion should come as a planned program and not haphazardly. Our measurement goes back to the earliest formalized records of man. Once man could count, he needed a standard for comparing quantities. Measurement was designed to create this standard. Early measurement standards were generally taken from common physical objects. In the ancient world, one system of measurement of length was based on parts of man himself - the smallest unit was the width of a finger, or a digit. Four digits made one palm, or the width of the hand above the thumb. The span was the spread between the outstretched thumb and the little finger which equalled three palms. The cubit was the distance between the elbow and the tip of the middle finger, equalling two spans or six palms. The pace was equal to 10 palms, and the fathom was the distance between the outstretched arms, or four cubits. Now, of course, man is strictly a non-standard article, so basing standards on his physical measurements was rather an "iffy" procedure. Yet the Egyptians, using this system of measurement, built the great pyramid Krufu with an estimated mean error in length of the sides of only one part in 4,000. A present day standard, which is a curious survival of these ancient measurements, is the standard guage of railways - 4 foot 8-1/2 inches. That is an odd number if there ever was one! This is the old Roman pausus, or double pace. The Roman chariot wheels were set this distance apart as shown by ruts preserved under the lava in the streets of Pompeii, and the standard persisted through the centuries to reappear in the Stockton and Darlington Railway of George Stevenson and the other coal haulage ways of the north of England.

The trouble with these early standards of measurements was that each different locality, almost each different occupation, might use a different standard. In days of poor communication and limited trade, the confusion could be tolerated, but with the advent of better communication and burgeoning trade, the need grew for more widely accepted standards. The result is a series of measurement units that have grown out of the practices of the various trades which are not suited to their immediate purposes, but are haphazard and illogical in their relation one to another.

France, on the other hand, tackled the problem in the enthusiasm of revolution when everything was to be made new in a brave new world - a completely fresh, coherent and logical system of measurement was constructed, which was the metric system.

Our metric system has had its ups and downs and has been modified over the years. First instituted in France in 1795, it was not finally adopted on a mandatory basis until 1840. For scientific purposes it was codified in what was known as the CGS - centimeter, gram, second system - one that many of you may have been familiar with in high school days, and later for more practical uses, the MKS - the meter, kilogram, second system - was adopted. Both these systems have now been superseded by the internationally approved *Système International d'Unités*, or SI units. It is this system, as adopted by the General Conference of Weights and Measures in 1960, that Canada is making her standard of measurement and has adopted in the form of a national standard of Canada, which was issued two or three months ago.

Now this movement to adopt a standard metric system of measurement is worldwide. Apart from the English-speaking world, the use of metric measures is universal. India adopted them after her independence, and Japan completed a long process of conversion during the last decade. Within the English-speaking world, Great Britain, in 1965, declared for a gradual adoption of the Metric units, looking to that system in time becoming the primary system of weights and measures for the country as a whole. In 1968, after receiving a report from the Standing Joint Committee on Metrication, the government accepted a target date of the end of 1975 for the country to be predominantly metric. In a white paper issued in February 1972, the Secretary of State for Trade and Industry reaffirmed the reasonableness of the target date of 1975. Actually, they have done very well in industry, but in the consumer field they have fallen behind somewhat substantially, and it may well be 1977 or even later before some of the crucial consumer areas are tackled. However, they are moving now in the consumer area on a much wider front and we hope the momentum will be picking up in that area. Industrially, the change has gone well. In its original declaration the government laid down the policy that costs will lie where they fall. They have adhered strictly to this policy. They have not suggested any changes.

Australia passed the Metric Conversion Act in June 1970, stating as its object the bringing about progressively the use of the metric system of measurement of physical quantities. A metric conversion board was set up to plan, guide and facilitate, to prepare an overall program, and to coordinate implementation. The target for completion was set for the end of 1979. The announced policy of the government is that the costs of conversion will, in general, be borne by those incurring them. Rapid progress has been made in the three years since the board was constituted. Numerous industry committees have been established and detailed plans for conversion have been prepared in each individual industry. Implementation of these plans is in full swing and the board is aiming at conversion being more than 70 percent complete by the end of 1976. I was in Australia early in this year and noticed that in most of the states, I think in all of the states, education was being changed in the primary level in that school. Their school year starts with the calendar year because of their different climatic conditions, and they were just moving into the change at the primary grade level through all the states, certainly in most of them.

New Zealand established a Metric Advisory Board in 1969 and, in April 1970, the government announced approval in principle of converting to the metric system of measurement over a seven-year period, giving a target date of the end of 1976, and again, costs are generally to be met by those incurring them.

South Africa has made great progress in metric conversion and may complete its program by the end of this year. They had a Metric Advisory Board but implementation has been in the charge of the Metrication Department of the South African Bureau of Standards. The conversions relied to a much greater degree on directives from the government than has been the case in Great Britain, Australia or New Zealand. Some compensation there is contemplated for the cost of converting, but only for converting weighing and measuring devices used in trade. They do not compensate for any other expenses.

The United States Congress, in 1968, passed the Metric Study Act, directing the Secretary of Commerce to arrange for a broad inquiry and evaluation of the policy choices open to the United States in regard to the possible adoption of metric units of measurement. This became the U.S. Metric Study. The report based on this study is entitled, "A Metric America, A Decision Whose Time Has Come". The recommendation of the report is as follows: On the basis of the evidence marshalled in the U.S. Metric Study, this report recommends that the United States change to the international metric system through a coordinated, national program over a period of 10 years, at the end of which the nation will be predominantly metric. This report was forwarded to Congress by the Secretary of Commerce. He stated his agreement with the conclusions of the report and recommended a firm government commitment to the goal of metric conversion. Bills were submitted both in the House of Representatives and the Senate to make effective the recommendations of the report and to provide for a non-mandatory conversion over a period of 10 years. The Senate held two days of hearings last year and in August passed a bill designed to implement the recommendation of the report. Unfortunately, there was not time for the House of Representatives to act before adjournment and the bill died with the 92nd Congress. The present 93rd Congress has before it similar bills to make effective the recommendations of the metric report. At hearings held early this year by a Subcommittee of the Science and Astronautic Committee submissions made were overwelmingly in favor of metric conversion. Since Congress reconvened after the summer recess the subcommittee has reported out a clean bill which is now before the committee as a whole. The bill is expected to be reported out from the committee when Congress reconvenes in January. Congress goes into recess on the 20th of this month and it is unlikely to be reported out before that, but it is expected to be reported out in January and the bill is on the President's priority list to be dealt with at the present session.

In Canada the government issued a white paper in January 1970 setting out the broad principles of its policy in regard to the metric system of measurement as follows: (1) the eventual adoption in

Canadian usage of a single coherent measurement system based on metric units should be acknowledged as inevitable and in the national interest; (2) this single system should come to be used for all measurement purposes required under legislation and generally be accepted for all measurement purposes; (3) planning and preparation in the public and private sectors should be encouraged in such a manner as to achieve the maximum benefits at minimum cost to the public, to industry and to governments at all levels. Subsequently, in June 1971, the government by Order in Council established the preparatory Commission for Metric Conversion, or Metric Commission, as we call ourselves now. The Commission is instructed to investigate the implications of conversion to the metric system. It is to prepare an overall plan for conversion, coordinating the process in the different sectors of the economy so as to effect the change at the lowest cost consistent with obtaining the best advantage to Canada. It is asked to advise the Minister on the need for legislation or other action to facilitate the conversion, but has no power of importance. Conversion is to be planned and coordinated, but not legislated.

Now, I have at present 17 commissioners. They have been selected to be widely representative of the economy, both industrial and non-industrial. They have been drawn from the different areas of Canada and represent the main language groups. As you were informed, Mr. McArthur comes from Alberta and is one of our stalwarts. We have two representatives from Saskatchewan, two from the Coast and then one from Manitoba, and so on. The first step of the Commission was to approach all the more significant trade and industry associations, asking them to study the impact on their industries of metric conversion and to suggest a timetable most suitable to their particular conditions. It has also written to all provincial governments to inform them of the Commission's approach and to call attention to a number of areas which would appear to be primarily a provincial responsibility. Among the most important of those, of course, is education. The Commission also established a number of steering committees, each responsible for planning and coordinating within a particular sector of the economy. These committees consist generally of two commissioners as chairman and co-chairman and a number of members invited from the major associations or industrial groups forming part of the sector. These committees have been analyzing the replies received from various associations, and studying the most effective methods of planning for conversion in their economic areas. One of these steering committees is of course concerned with the field of education and training, and Miss Chapdelaine, who is here today from the Commission, is the sector plan manager in charge of the work of that area.

It soon became obvious to us that these steering committees with the wide range of industries included in their responsibilities, particularly in those dealing with the area of industry, could only act effectively as coordinating bodies and that actual planning would have to be done at a level much closer to the individual firm or industry of interested groups. Accordingly, we set up in the area of each steering

committee a number of sector committees, each based on a single industry or related group of industries, or related interest groups. These sector committees were drawn again from the major companies or industry associations or interest groups in their sector. Each steering committee has assigned to it a permanent member of the Commission staff as sector plan manager, and this officer is responsible for assisting in the organization of sector committees and in arranging for the prosecution of their work. In the case of education we have sector committees dealing with the different phases of education - primary and secondary, post-secondary, non-university, university, and training. The first task assigned to the sector committees is to determine the metric units which are to be used by the industry. This of course doesn't apply to you in education but it is very important to you to know what is being done in the field of the whole economy.

All industries, of course, are supposed or expected to make use of the metric units which form part of the SI system and are in accordance with the national standard of Canada which, as I said, was issued just recently. However, each industry may wish to select from the range of units those that are most appropriate to its own use and to pursue the most desirable, so that there be agreement within an industry on the units that are going to be used so that all the firms are talking the same language within that industry. These committees are then asked to recommend priorities for standards writing bodies in producing the metric standards necessary for conversion. They are also asked to recommend priorities in the revision of legislation and regulation by public bodies, consequent upon metric conversion. Much legislation and regulation specifies requirements and customary units only and must be revised to permit proper metric conversion. Both of these fields are fields of potential bottlenecks - standards writing and legislation and regulations, and it is essential that the most urgent matters be dealt with first, and that time is not spent on matters that could be postponed. With these preliminaries out of the way, the committees will be in a position to start on the specific conversion plan for that industry. These plans will only be guides and each firm will be finally responsible for selecting its own time program for conversion. However, the industry consensus on the time limits within each step which should be taken will be a valuable guide to the individual firms and would enable planning to be coordinated between different industries and economic areas. This coordination is most important to ensure that suppliers and customers are in phase with the industry program, ready to supply metric materials or to receive metric products when required. The coordinating responsibility lies with the steering committees for their economic areas and with the Commission itself for the overall planning.

Within the federal government each department has to assume responsibility for examing its own operations. All measurement-sensitive activities have to be identified and the necessary plans made for conversion. High priority has been given to review of legislation and regulations to identify all clauses which are measurement-related and which may require amendment. The volume of this work will be

considerable and careful study is needed to prepare necessary legislation in the most suitable form and plan for the requisite legislated time. Obviously, priority must be given those acts whose provisions would make possible the adoption of suitable metric units. The requirements of prescribed rates for the sale of some food commodities is an example. Government operations have a substantial impact on the general economy and in turn are affected by changes in the economy. Neither the public nor the private sector can operate as an island to itself. The Commission has therefore asked those departments concerned with areas of responsibility of particular steering committees to nominate officers to act as advisors to these committees. These officers provide a direct channel of communication between their departments and the Commission. Similar arrangements are being made for the sector committees as the need arises for communication from either party. The Commission has allocated to an officer the responsibility for maintaining liaison in the government, and each provincial government has designated an officer through whom the communication to and from the Commission can be channeled. The Commission has arranged to send the provincial governments through these designated officers copies of minutes of all steering committees so that these can be furnished to the interested departments. And we encourage the departments to deal directly with the steering committees on matters that seem to be of importance and concern to them.

Planning conversions in industry is only part of the Commission's task as we were reminded a little earlier this morning. If metric conversion is to be effected in Canada, it must be prepared for by education and supported by a public information program. Metric conversion is going to affect the individual citizen in his daily life. He must be able to understand what it is all about, why it is happening and what the changes are that he is going to have to meet. Now, education in a formal sense is a provincial responsibility. The Commission's task is to provide the information that will enable the provinces to coordinate their planning. Children now entering primary schools will graduate in 12 years' time to a metric working world in which they will not need to make any use of Imperial units. Children now moving to the secondary level will have to have competence in handling both measurement systems. At the level of vocational training and adult education the immediate requirement is still for measurement in Imperial units but the opportunity for metric instruction should not be foregone. Clearly, this is a situation that calls for careful planning of the necessary changes in instruction. In our view, in the Commission, the earlier the start that can be made at the level of the primary grades, the less probability there is of children having what in the long run has only been regarded as wasted effort devoted to learning in detail the Imperial system of units, when this is not going to be a part of their life in the future. They are, of course, living still in a world (rather, in an economy here in Canada) using Imperial units. We would hope that the programs of information that we will be undertaking, and the starting of change that will be flowing through the economy within the next very few years would

deal with the difficulties of children feeling they're being educated in one system with no relation to the real world which they see outside the school. So, this is a matter no doubt that will come up for discussion both today and tomorrow and which bears some discussion in depth.

Another point that I would recommend for discussion, and it is probably in your minds already, is the fact that in going to metric units of measurement you are dealing with a system which is inherently decimal in nature and which does not require the use of fractions. This brings in the question. At what point should the child be introduced to the idea of decimals? And how early can this be done? If the child is going to be dealing with measurement in metric units, he starts with the appreciation of what a centimetre is and then builds up to the metre with a hundred centimetres, and so forth. He will be dealing with decimals at a very early, much earlier stage than at the present and not introduced to fractions, except as may be necessary for the simplicities of ordinary life. These are questions that belong to you as people working in the field of education which we in the Commission put before you for consideration and particularly in emphasizing the long-term considerations that you have to give them because we are going to be living in a metric world and we hope we will be living in it for a long time, so that our planning should be right so that we do not get off on a false start and then have to go back and change it. I know, in Britain, one of the difficulties they are having is the appalling lack of knowledge of the decimal system, and decimal notation throughout the economy in England. People are just frightened of decimals and they do not know what they are. This extends quite widely apparently and this is one of the difficulties that they face at the consumer level. Now, we have the great advantage that we have lived for over a century here, now, with a decimal currency, so that our children naturally think dollars and cents which is, in effect, a decimal notation that they come to in their earliest experience. So we do have a great advantage there and it is possibly something on which we can build.

Now, at the level of technical institutes and community colleges, and particularly at the level of this vocational centre here, there is a tremendous opportunity for service to the community in providing the courses in metrics for people in industry who require a more comprehensive knowledge than can be acquired in training on the shop floor or in the office, and also in upgrading, as is being done here at Alberta Vocational Centre, the capability of people with deficiencies in their education, and this will particularly apply in the area of an ability to understand the decimal notation which will be important in life in the metric world.

Now, in regard to the higher education level, what I have in mind is designers and draftsmen, shop supervisors - that type of person. They are going to need a fairly comprehensive knowledge of the metric system, and, of course, they are going to need a knowledge of the units of force and pressure. The electrical units do not change from the present practice in most cases, but force and pressure units are very

different indeed from those of the old CGS system and this will need some careful planning of courses. And it seems to me that industry will be very happy if the community colleges and technical institutes and institutions at that level will take the responsibility of offering such courses. Now, those, of course, should certainly be on the basis of cost recovery because industry is then spared the necessity of doing this for itself, but the availability of these courses will be a great service to industry and at the same time they can be available to the ordinary, informed citizen who wants to know what it is all about and who wants to increase his education. So we see this as a most important function and one that no doubt will come up in your discussions.

We are working on the long-term program of public information. We expect to make use of all media communications - press, radio, TV, film, audio-visual, talks, exhibits - anything that you can suggest to us. This program has to be planned to conform to developments in the process conversion. We see this process as involving four phases. First, you have investigation. Then you move to planning. And then planning that involves scheduling. And when you have your plan and your schedule, then you have to implement. The proper performance of the first three phases is essential to a smooth accomplishment of the fourth. Good implementation rests on proper investigation, good planning and scheduling. Each of these phases will reach a peak of activity and will then decline to be succeeded by a peak in the next phase and each phase will require a different emphasis in the public relations program, so that the public is informed of what is going to happen and why, and not stirred up too early and then let down by an apparent lack of activity while the main emphasis is still on planning and scheduling.

Now, industry, government and the people of Canada want to know what is the objective of the Commission for making metric conversion effective. There are obvious advantages to both Canada and the United States in programs for metric conversion that are reasonably coordinated. The Commission has been watching the progress of legislation through Congress to approve a program for voluntary metric conversion. However, industry in the United States is moving on a broad front to implement conversion programs without waiting for the passage of legislation. The Commission now feels Canada can plan her program with assurance that a similar change is coming in the United States. It is accordingly preparing a recommendation to Cabinet for approval of guideline dates for Canadian programs which will best serve Canadian interests in relation to developments in the United States and the rest of the world. In the meantime, we have to push ahead to our planning for conversion so that all of us will be ready to meet the targets when approved.

And I can give you a couple of specific examples of the planning that is being done. In talking with the meteorological people, we have a target of sometime in 1975 for changing the public information on weather. We start with the temperature and then move into rainfall, snowfall and finally into wind velocities. That we hope can quite

competently be done in 1975 and will create a visible move to metric that will affect most of the people in the community.

The Roads and Transport Association of Canada which is the committee on which all the highway departments of various provinces are represented, has been doing planning and it is talking in terms of a plan for conversion of road signs and speed limits in September 1977 and this looks a fairly realistic program, too.

So this will give you two sort of key ideas of the way we expect this program to go. But certainly by the time we get to road conversion we will be in the full flood of conversion throughout the economy so that you need not be too afraid of children being marooned with a metric education and nothing metric in the outside world on which to cut their teeth.

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Questions from the floor

Q. You said one thing that the steering committee were doing - they were deciding what metric standards they would be using. I don't know what that means. In the sense that it seems to me that we are going to go on the SI system, the standards that we are going to be using have already been decided. Now, could you expand upon what that means?

A. Yes. Now, I am talking of standards in the sense a product is made to certain standards. That is, the standards may be performance standards, may be measurement standards, may be standards of size, it may be standards of thickness of material that is used, to strengthen material that is used, and so forth. I think the Canadian Standards Association has some 3,000 standards in effect. Not all of these are measurement standards, although probably the great majority are measurement standards. They are mostly used in industry in products, but there are a number of consumer standards, too. For instance, the design of a can may be a standard matter - all that sort of thing. There are standards and as the measurement of these standards are based on, designed in Imperial units, many of these standards may have to be changed to achieve a satisfactory design in metric units. Now some designs can be changed over a straight self-conversion, that is conversion to the direct metric equivalent, but others cannot because the numbers become awkward. All your building codes are standards, for instance, and these all have to be brought in line with proper metric practice.

Q. I do not quite understand the direct relationship between the Standards Council which was set up in 1971 and CSA and the previous industrial standards association.

A. Well, the Standards Council is a coordinating body and also has taken responsibility for international standards activities. It is not a standards writing body. CSA is the standards writing body and that is its main function. The international work of the Standards Council is contracted to the former CSA international organization. In other words, they work very closely together. But the primary point of the Standards Council is that they provide a public body with access to public finance to support the work, the voluntary standard work that is so important throughout the community. That is particularly important in Canada where a very great number of our standards, are, to use the jargon, externally generated. In other words, they are made outside the country. A great majority of the standards used in industry will come from the American Society of Testing Metals, the Society of Automobile Engineers, and so forth. All the North American associations, the professional associations or technical associations are normally, of course, centered in the United States and dominated, although the Canadians have a voice, and often quite an important voice, but still the standards are externally generated. Now, in some cases, Canada may want to make her own standards. There are many standards we are going to live with that are continually externally generated standards but the Standards Council provides the means by which standards writing bodies can be given the competence to deal with the volume of work that is involved in the creation of standards necessary to a modern industrial state and particularly in view of metric conversion.

Q. Would you say how many standards are metric standards that CSA have produced in the four years since the white paper?

A. Frankly, metric standards, I don't think many. Of course a number of standards have to be produced with metric equivalents which is a different thing, but we are only now getting down to the work of producing metric standards. Remember, the need for a standard starts at the level of the industry or the firm. They have to come up and ask for the standard. It is not something that is imposed from the top except to some extent in consumer work and so forth. Safety - that may be imposed from the top but the design standards mostly come from the demand from the individual industry level.

Q. ... in British education they got 1400 standards in the first four years; in Canada we are lucky if we have 100 standards in the first four years.

A. Well, that is true although, of course, there is also work going on in the North American standards writing bodies where they are

very conscious of the need, also. They are for metric and metric standards but production will not be entirely dependent on this. Firms are quite capable of setting up their own temporary standards to bridge over a period. As you say, it is harder for the small company.

Q. A lot of people in continental Europe are dealing with the old metric system. What is the significant difference between the SI and the old metric system?

A. The most significant differences lie in the field of force, unit of force and those units that are derived from it which include pressure. The Newton which is the unit of force is quite different from the old kilogram force which was part of the CGS system. Now, I do not think that that is going to affect any great volume of people except those who are in a technical field and required to be working with force and pressure units. Now, of course, all of us will be affected by the question of what our car pressures are measured in. Once we have accepted the units, now when you say 20-26 front, 28 rear, you don't think of pounds per square inch, you just think of a figure. Well, when that is expressed in kilopascals you say 170 front, 180 rear, you are talking kilopascals. Once the figure is in the mind, the meaning of kilopascals is not important to you in that sense. It is, of course, important to anyone who is engaged in working on pressure vessels or something of that nature, or in scientific work of any kind or in design work, but they are relatively a limited group. But that is where the principle differences lie.

Q. I think we should emphasize that we are going SI more than we have in the past. For example, there is a radio station here in Edmonton who thinks it is very progressive by giving the temperatures in centigrade - and not in SI or Celsius.

A. Well, that is true. That is one of the annoying difficulties, that is, the change in name. The reason for that was that in some parts of Europe the grad is used as an angular measurement and the centigrad is 100th of a grad and an angular measurement. So, because of the confusion that existed in this regard, it was decided to call the temperature range Celsius instead of centigrade. Celsius is the name of the man who actually developed that particular temperature range based on zero at freezing point and 100 at boiling point of water. We are asking the radio and TV people not to broadcast temperatures in Celsius yet because it should be done on a unified basis and come as a proper plan. So, in these sporadic cases, we have asked them just to hold off because otherwise people may get confused or you may get an adverse reaction which would be less likely in a properly planned and prepared program.

Q. We wonder about the spelling changes concerning the spelling of metric and whether we are going to call it *er* or *re*.

A. The National Canadian Standard is quite definite. It is *re* - metre, litre, but of course gram is gram. Now, this is the National Canadian Standards and a point of reference.

Q. ... weights and measures ...

A. With regards to weights and measures, we have not reached definite conclusions with the Home Economics people yet, but we are very conscious of this. Of course, remember, here, that the cup is the most used unit of measurement and people don't weigh to the extent that they do in Europe. In fact, relatively little, so that it may not be so much of a problem and of course as long as the housewife keeps the same measuring instruments in the kitchen, she goes on with the same recipes. It is only if she breaks her present cup and if we introduce a metric cup which is not by any means decided yet, and only a metric cup is available in the shops, then you start to get into trouble. But we are working with the Home Econimics people and we recognize that this will be a problem. Of course, she has got to cope with a stove which eventually will register in Celsius, not Fahrenheit, and has to know the oven temperatures necessary, and of course, the meat will be in kilograms instead of pounds but that is not too hard because it is only a little over twice and for all the accuracy in cooking times, twice is probably as in two pounds per kilogram; it is probably as easy a conversion as anything.

Q. It is the important thing in a recipe but if someone of you gentlemen could answer me, why has it to be such a traumatic experience for the English-speaking world to transfer from a fairly nutty system into something far more logical? Then, is it not half as traumatic as to go from something very logical into something that is slightly crazy?

A. I agree with you absolutely. So many of our people who come out from Europe have successfully adapted to our, as you say, "slightly nutty system" and yet we think it is going to be an awful job to take the much more logical system that is in effect in Europe.

Q. Whatever it must be, why do you insist on repeating that it has to be shock?

A. (*Torgunrud*) - I think that I am more in a position to respond to that than our speaker because if he used the word *shock* it was perhaps in response to something that I said. I find, and I would bring this to your attention and I would also invite Mr. Gossage to react to this, I was very taken with his reference to the fact that the consumer action in Britain has dropped sadly behind the technological change and I would ask this question of Mr. Gossage. In

terms of Toynbee's historical analysis that technologically we have outstripped ourselves in brilliance but we are still in sociality quite depraved and I think, as far as I am concerned, that apart from the beauty and logic of the system, we still face the very significant question of changing humans even be it from a nutty system to a logical one, and now with that kind of a transfer from the actual mention of shock which was my introduction, Mr. Gossage, if you care to respond to this relationship between the conversion of that which is technological as opposed to bringing along the sociology of people. I would appreciate comments in that regard.

A. Yes, I would like to comment on that. Actually, I do not for a moment think that this is going to be a shock in that sense at all. Actually, in the ordinary things of life, you may have to look to notice changes in many areas. We do not use measurement as such in our daily life very much. We are accustomed to everything coming in a prepacked form, if you like, or in dollops that we think of that as a size and not as a particular measurement. And they will continue. Maybe the size of the particular dollop or package is varied a bit but it is not going to be a significant difference, I do not think.

In regard to the difference between the technological and the consumer in Britain, a lot of this was due to the political difficulties that were going on in Britain and are still going on in Britain, related to the entry into the EEC which was quite a divisive influence in the country to the effects of inflation and the effects of the currency change where practically everyone in Britain is convinced that they were taken for a ride. Whether that is true or not, they are convinced of it, and what a person believes, of course, is what guarantees his actions.

Now, in Australia, where the currency change seems to have gone through with rather less traumatic traces, the attitude of the consumer has been much more skillfully handled on the part of the metric conversion board. They have purposely involved the broad area of people as early as possible. They deliberately chose something that would affect a great many people and in Australia they chose horseracing. The Australians are inveterate gamblers on horseraces and at the time of the Melbourne Cup, which is the major race in Australia, they tell me that Australia stops dead for 10 minutes. Nothing happens. Everybody who is not at the race course is watching on TV or on the radio and yet they changed the length of the Melbourne Cup. It measured 3200 metres instead of (I forget how many furlongs it was), but they changed the length and all the records have to start fresh. Now, when you change horseracing in Australia, jockey weights and the distances and so forth, and when the broadcasters start broadcasting the race, they will say he is 300 metres from the post, instead of how many furlongs from the post.

This really does bring home to people that something is happening. They got away with this successfully. It was planned. They got the support of the racing association and of the press, particularly important of course, and of the broadcasters, and they got away with it. The result is that the changes are going rapidly, quite rapidly in Australia. It was estimated that perhaps 15 percent of the articles on the shelves in the huge supermarkets, when I was there, were in metric measure. Nobody was taking particular notice of it. The fact that sugar was all in a metric pack - it was all in packs of one-half kilogram, that is 500 grams, a kilogram, two kilograms, was not upsetting the housewife. That indicates that with a proper introduction you do not get too much shock. It is the question, as you say, of proper techniques - I do not like to say of consumer manipulation, but of consumer information and education.

Miss Claude Chapdelaine

Miss Claude Chapdelaine is the sector plan manager for education with the Metric Commission, and is also a liaison officer with the curriculum committee of the Canadian Council of Ministers of Education.

Miss Chapdelaine is a native of Ottawa, working for the Civil Service. As a child of one of the senior officials of the Canadian External Services she received her elementary and secondary education in a number of different countries, including France, Germany, Sweden and Brazil. Mlle. Chapdelaine is fluent in French and German as well as English.

Miss Chapdelaine has worked with the federal government as a language teacher teaching French to deputy ministers. She then moved to an even more demanding and unwelcome job as a classification officer for the Treasury Board. She then left to go to what is called the Career Assignment Program which trains people to take management positions in the federal civil service, and, as of June 1973, moved in as sector plan manager for education in terms of the Metric Commission.

She recently completed a national tour, visiting the provincial capitals and discussing conversion to the metric system with people in provincial departments of education.

THE PRESENT STATUS OF CONVERSION TO THE METRIC SYSTEM IN CANADIAN EDUCATION

Miss Claude Chapdelaine, Canadian Metric Commission
Liaison Officer with the Curriculum Committee
Canadian Council of Ministers of Education

As Mr. Gossage has outlined some of the developments on the world scene as well as happenings in Canada regarding metric conversion, I will try to paint a picture in large brush strokes showing some of the developments in the field of education. The information was gathered in conversations with the officials of the different departments of education across Canada. I spoke to the curriculum directors who are members of the Curriculum Committee of the Council of Ministers of Education. This committee was given the responsibility for metric conversion in education nearly two years ago. The Metric Commission has established liaison with the Council and we are invited to attend the meetings of the curriculum committees, and that is how I am liaison officer between the Council of Ministers, through the Curriculum Committee and the federal Metric Commission. So, I will try to present this information in the form of a news broadcast, starting in Eastern Canada, moving West.

The Metric Commission, as Mr. Gossage pointed out, is organized along the lines of 10 steering committees dealing with various aspects of the Canadian economy and society. The tenth deals with education. The committee is composed of members of various associations in the field of education such as the Canadian Teachers' Federation, the Home and School and Parent-Teacher Federation, the Canadian Vocational Association, the Canadian Adult Education Association, the Canadian School Trustees' Association, the Association of Universities and Colleges of Canada, and the Association of Community Colleges. So, steering committee number 10 is chaired by Mr. Willis Hall, who is a commissioner of the Metric Commission. Mr. Hall is the assistant director of youth education in the Nova Scotia Department of Education. This department has set up an interdepartmental committee on metric conversion involving adult education, curriculum officers, teacher-training people, vocational training, technical training, and in-section services. Two ad hoc committees, one on primary and one on secondary education report to the interdepartmental committee. The committee on primary education is developing a teacher-training workshop which will be tried out at the end of this month, October 1973. If successful, it will be ready for general use shortly thereafter. The workshop will also be used to train teachers in secondary education. The Department of Education is planning an active in-service training program for teachers once the workshop is ready for general use. Nova Scotia has just announced that they have decided to start teaching the metric system as of September 1974 in primary grades 1 and 2 and grades 7 and 8. Professor John Allen of the Nova Scotia Teachers' College in Truro, N.S. has become actively

involved and committed to metric conversion. Besides contributing to many publications, including *Nova Scotia Measures Up*, prepared specifically for teachers, Professor Allen often appears on open-line radio shows and he finds this an excellent way of getting at people in remote areas.

In New Brunswick there was as of August no structure for implementing metric conversion. They were in the process of setting up an interdepartmental committee on metric conversion which, in August, had not yet met. No specific plans have been made in the field of education, although a great deal of interest was shown with regard to the teacher training workshop being developed,as in Nova Scotia for instance.

The situation in Prince Edward Island is quite similar to that of New Brunswick. However, the Secretary to the Cabinet was planning to prepare a motion to be submitted to Cabinet giving metric conversion official sanction. Hopefully, this will have a snowball effect and incite government departments to action.

In the Province of Quebec they are in the process of creating an interdepartmental committee on metric conversion. There is no committee in the Department of Education, although one may be established towards the end of the year. The director of curriculum there has asked the different subject matter program directors to identify the problems they foresee in the field of metric education. A consultant has been appointed to look after questions pertaining to metric conversion and he is Mr. Guy Richard, former president of the Metric Association of Canada. Once a global plan has been developed, the curriculum director hopes to use a network of critical paths to show the information. He expects metric education to start at the primary level, followed by the secondary, college, university, and finally, adult education. In September 1973 a memo was sent to school boards to safeguard them against various editors or manufacturers who may be selling inadequate materials and outlining some of the planning going on in the department.

In Ontario, the Ministry of Education of Ontario has set up a task force on metric education headed by Mr. Jack Bell, who is usually introduced as follows: height 180 centimetres, mass 84 kilograms, handspan 23 centimetres, foot length 29 centimetres, and age 1.6 gigaseconds. I'll leave you on that one. That is a great one for girls. Mr. Bell is preparing metric guidelines dealing with all aspects of life in a metric world. They will be directed at teachers of all subjects, not only math and sciences. They will point out some of the expressions we will have to change once we live in a metric environment, such as speeds, distances, areas, and consumer details. These guidelines will have to be approved by the Minister of Education and it is expected that they will be released sometime during the academic year. Numerous school boards in Ontario have announced that they have gone *metric*. This information, I am told, can be misleading as one does not really know what they are teaching and to what extent; and, on the other hand, I understand some boards have not announced anything yet and are doing quite a bit of work

in the field of metric education. This year the Ministry of Education in Ontario is stressing teacher training in order to introduce metric education in September 1974. This would be completed over a period of four to five years. The Ministry also hopes to publish its metric guidelines before too many boards independently start teaching the metric system.

In Manitoba, the government has established an elaborate structure for metric conversion. An interdepartmental committee which is known as SAM, which stands for Standards and Metrication meets about once a month. The Department of Education has its own metric committee dealing with schools. Its members are taken from the Faculty of Education, the administration of schools, teachers in such fields as social sciences, home economics, physical education, and officers of the Department of Education. The committee acts as a facilitator for metric conversion. The Department of Education has prepared and published a teacher-training workshop called *An Introduction to the Metric System*. Mr. Bullock, the director of curriculum, has forwarded copies to departments of education, I understand. The workshop includes a video-tape and before and after exercises. In other words, they ask people to estimate heights and lengths, weights and so on, and then they give them the training in basic metric units. Then they are asked to re-evaluate and see how close their prediction was. An extensive training program is taking place this fall in Manitoba in order to start teaching the metric system in schools as of January 1974 and continuing in the fall of 1974 from kindergarten to grade 6. Of course, this teaching will be on a voluntary basis on the part of teachers. A cost study foresees that it will cost some $120 to equip classrooms in primary grades. These are sort of tactile aids in metrics - metre sticks, rulers and litre measures, and so on. This figure includes equipment only. Manitoba also has a metric committee on community colleges including representatives of the three community colleges in that province. The committee developed implementation plans with various phases. Each community college in turn has a metric committee to oversee the implementation of these plans. The plans were sent to the directors of curriculum with the last curriculum committee's report. During academic year 1973-74 basic instruction in the metric system is being given the instructors in these community colleges.

In Saskatchewan, a metric conversion curriculum committee is being considered involving schools, administrators and other interested parties. The Department of Education hopes to capitalize on some of the materials being prepared by some of the other provinces. They were most interested for instance in the workshops being developed in Nova Scotia and Manitoba.

Going on to British Columbia, the big news in B.C. is that they have introduced metric measurements in grades 1, 2 and 3 in September 1973 and will continue in grades 4, 5 and 6 in September 1974. Progression will probably be one grade at a time after that. In three to four

years the math series will be all metric. I understand the Addison-Wesley are producing a metric series of math textbooks and grades 4, 5 and 6 are expected to be ready next fall. Grades 1, 2 and 3 are already ready this year. There has been no in-service training of teachers to date in British Columbia, but Mr. Naylors, the director of curriculum, tells me that he has spoken to the British Columbia Teachers' Federation on this subject and the B.C. government has expressed an official commitment to go metric.

So, in conclusion, it would appear from the information I have gathered that the progress of metric conversion in education is happening in an individualistic fashion, each one at his own speed. I would suggest that one should not forget Aesop's fable about the hare and the tortoise - slow and steady wins the race!

The Curriculum Committee will be meeting in Toronto in January 1974 to discuss provincial plans for the implementation of metric conversion. These plans are to be ready for the meeting of the Ministers of Education in January. The Curriculum Committee will only be meeting once a year from now on and, depending on the progress already made by the provinces, a metric education task force may be created to continue the work in the field of metric education. Thank you.

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Reaction from members of panel & questions from the floor

Q. (*Torgunrud*) - The question primarily is - What if any, has been the thinking in the use of television in the introduction of the conversion to the metric system?

I think I would like both of our guests to react to this. Claude, if you would indicate if there are any beginnings in this area in any of the provinces and then I know for instance it was alluded to in your presentation, Mr. Gossage, that the Commission itself is very definately involved in something in this regard.

A. (*Miss Chapdelaine*) - I think that the only reference made to television from the conversation I have had is that in Manitoba with the workshops that they have developed, there is a video-tape that is sort of the introduction to some 20 minutes of basic facts and skits - very cleverly done, quite amusing. That is basically all I have heard that is being prepared for, if you can call it that, television.

(Gossage) - I would agree certainly that television is an instrument that we want to use. Now, of course, specifically in the educational field this is outside the competence of the Commission and is the responsibility of the various departments of education, but the development of some sort of model program might be of great value. We will be using television in a general program of public education and the objective of course will be to familiarize people with the idea of metric and with something on the basic units. It might be of interest to the group to know that we have had some discussions. They have not come to a conclusion yet but they are continuing with the Ontario Institute for Studies in Education. They are working with computer-assisted techniques and if this can come to something, this might be a very fruitful field for the development of a model program for a computer-aided study. Similarly, we would certainly very much like to see, and would be glad to work with, any community college or similar group that wanted to develop a programmed learning system because again the techniques both for the computer-aided and for the simpler program learning techniques would certainly seem to be very well adapted to teaching people the principles of the metric system.

We can use the facilities of Metric Canada and Information Canada in distribution. We haven't gone to them for publishing as perhaps they are not the most rapid people in the world in producing material. I think that possibly we would, if they can produce it fast enough, we certainly would use them. We can use their distributing facilities to good advantage and any services that they can give us, but a lot of work is a little specialized for the organization of Information Canada to assist at present. We will make use of anything we can but we will not be tied to it if we can get a better job done outside. That is really our position.

Q. I note that the literature presented to us at the beginning of the day is printed on A-4 paper. Do you have much difficulty obtaining such paper or, in fact, any of the other sizes at the present time?

A. *(Gossage)* - No, we do not have too much difficulty in getting it but this whole question of paper sizes is something that is the centre of a storm of controversy at present. The fact that we have used A-4 paper does not mean that we necessarily say that the ISO paper sizes are related to metric conversion. There are attempts at standardization and we do promote standardization wherever it will serve the purpose of rationalizing and can be combined effectively with metric conversion. But the question whether the ISO sizes are more suitable to North America or not, or even whether they will eventually be the international standard still is a matter of intense controversy and study. The Canadian Government Specification Force has been asked by the Standards Council to form a committee to write a standard on paper sizes in Canada and this

will bring out the controversy that exists between the supporters of the ISO sizes and the continuous form people who have very serious technical difficulties. In fact, they cannot with their present machinery, which is worldwide, spread all over the world, meet ISO sizes. Also, with the producers, the suppliers, there are some who have serious reservations on the ISO sizes. This will all be fought out in the Standards Writing Committee. We have had a working group that has been working on it and which will turn over the results of their work to the Standards Writing Committee.

Q. Maybe I am asking for a personal assessment, but, Mr. Gossage, are you satisfied with the voluntary implementation of the metric conversion, or do you think that technically the government is going to have to legislate a deadline date?

A. (*Gossage*) - I mentioned the necessity of legislating a deadline date. I think, when we talk about a voluntary program, what is voluntary is that any organization can choose when it will do it but the economic logic of what is happening is going to compel everyone sooner or later to come into line and we, therefore, try to persuade them to do so on a coordinated and organized basis. To begin with, if we are trading in a metric world, those companies that are interested in trading outside Canada are going to have to have some form of metric production and if they don't want your production, they will be all in favour of conversion to metric. This involves quite a portion of the Canadian economy. After all, what is nearly 20 percent of our Gross National Product is involved in metric trade, so it is a pretty strong influence.

Then the government itself exerts a great influence through purchasing power, through the Standards that it elaborates. For instance, when sizes in which butter and milk and coffee and so forth, (the specified commodities) can be sold in the shop are changed, and there will only be a limited period in which the sizes will be expressed in two units because that would involve duplication of sizes, and therefore, the Imperial sizes will fade out. All these things put a pressure on the moving into a metric world. Then individual companies or even individuals will find it hard to resist. After all, government purchasing has a very wide effect on the economy. It will not be used as a whip, but it will be used as the carrot. At the proper time the government will ask bids to be submitted only on metric materials. People who do not want to go metric just won't be able to bid on government contracts. That will have a considerable effect. All the statistics that busness puts into Statistics Canada will sooner or later have to be put in in metric units. Which means that your records will have to be in metric units. If you don't want duplicate records, you had better change over. All these things are really compulsions and I think they will be sufficient to clean the job up. Remember, if the government legislated it, say the government now legislated

it with a deadline date, everyone will be entitled to say, well, if you say this is a legislated responsibility, why don't you pay for it? Once the government paid for it, the cost of conversion would skyrocket as always happens when anybody compares the cost for someone else. They don't worry so much about how they do it. The economy of conversion is by all individuals applying their ingenuity to do the job as effectively and cheaply as possible. This has certainly been the case in England where costs have in all cases come out much less than estimates. In some cases, quite spectacularly less. We want to encourage that type of individual responsibility which will achieve the results with ingenuity and effectiveness.

T. Vant

Tom Vant was born and educated in Edmonton. He graduated from the University of Alberta with a bachelor of commerce degree and later with a master of business administration degree. Following graduation he joined the federal Department of Public Works in Ottawa for a short period of time and then he transferred to the Western Regional Office of Public Works in Edmonton, still with the federal government.

In 1971, he came on the staff of the Government of Alberta in the Department of Industry and Commerce as Executive Director and, in 1972, was appointed as Assistant Deputy Minister for that department. Early this year he was appointed as executive director of the newly instituted Office of Program Coordination. One of his early tasks was heavy involvement in the creation of the Alberta Energy Company and one of his current duties includes the chairmanship of the Alberta Interdepartmental Committee on Metric Conversion.

THE METRIC SYSTEM: CURRENT STATUS IN ALBERTA

T. Vant, Chairman, Government of Alberta Interdepartmental Committee on Conversion to the Metric System

The committee that I am currently chairman of was formed in December of 1972. At that time, Mr. Gossage came out and really introduced his Commission's problems to us and initiated the Alberta committee. Since then it has met three times, which is not an awful lot, but each meeting identified so many problems that it took time to get back to the next one. Running parallel with this, a provincial representative has gone to a federal interprovincial meeting twice; the last one, which I went to in Halifax, was on October 4. Perhaps I could give you a little outline about what happened at that meeting and say something about where Alberta is in general in comparison to other provinces. The meeting really discussed the part that the provincial committee and potential subcommittees would play relative to the Metric Commission, the steering committees that are set up under it, and the sector committees.

We are currently wrestling with the problem of how the province relates to the federal sector committee, steering committees, and so on. There is obviously a need for representation and this will be discussed at the next meeting which is potentially slated for January. So, at that time we will have all the communication lines sorted out and we will be able to progress on a logical pattern basis.

The other provinces are not all running at the same speed that Alberta is. There is quite a wide variation, and I think Alberta is as far along as anybody is. Now, I do not say that with any particular pride. It is just a point of interest. Ontario has progressed very well, but Ontario has many, many more problems than we have, especially in the industry sector. Fortunately, as far as metric conversion is concerned, our problems are limited very dramatically by the absence of heavy industry in the province. So, while Ontario has put quite a bit of effort into it as far as meeting a timetable, they are really no further ahead than we are. They are still in the thinking and conceptualizing stage. There are a few isolated instances where other provinces are ahead in a specific sector, but by and large Alberta and Ontario are the two that are a good neck ahead of everybody else. Quebec, for instance, has not really appointed representatives, has not set up committees; neither has Saskatchewan, so that they have got to go through the whole process of actually setting up a committee before they can represent their provinces at these kinds of meetings.

Now, talking about the specific role of my committee, the major emphasis is to ensure that there is a filtering process that takes place between government departments, and we do have 22 Ministers in the provincial government, and therefore, this will take a fair bit of doing, especially in light of the rather loose timetable that we are confronted with still at this date. Because it is fine to talk about

projected implementation plans being finalized in 1976, but when in 1976, and is it really going to be 1976? We are still into these kinds of problems that everybody has been after me, provincially, about, and all provinces have been after the federal Commission trying to get that tied down. Now, they are unable to tie that down because they have to react to others around them. They have to react to the United States. They have to react to the export market. They cannot afford to get either too far ahead or too far behind the United States because they are our major customer. So, all these considerations make it very difficult to tie down the timing too tightly at this time but we are working on that and I am afraid that the educational sector is going to have to settle their timetable before the general timetable is finalized because that particular sector just cannot afford to wait for everybody else to come to the party. They have to be ahead because of this four-or-five-year gap that is necessary to get textbooks, to get teachers trained, to do all the various things that they have to do education-wise.

Another area where we will be involved is discussion with municipalities and this really has to rest on the provincial government. We have a lot of municipalities with a lot of different interests. It is another level of government that has interests nearly as broad as either the federal or provincial governments. They are interested in their particular community but their interests are just as broad, just as general, just as real, and they have time concerns and dollar concerns and training concerns just like everybody else has. So that, what we will be doing is to set up a subcommittee to relate specifically to municipalities. We plan to do the same thing relative to land problems.

Land problems, perhaps, are going to be one of the toughest to tackle. We now have all our titles in square miles or feet, or whatever, depending on whether you are talking rural or urban. All of these measurements are going to have to be converted and some reasonable system of conversion that is not going to either cost an enormous amount of money or create an enormous amount of confusion has to be decided upon. And, when you are talking about plans, you are talking about taxes, and it becomes all of a sudden very important. So we feel that a subcommittee will have to be set up to tackle that and we hope that that will relate to a steering committee or a sector committee under the Commission.

Another area, and I think the biggest area where we will be concerned, is that of legislation. The provincial government has hundreds of Acts and rules and regulations. It is difficult to visualize one that does not have some kind of measurement sensitivity in it. And all of these will have to be reviewed. The departments now have been asked to review potential legislative adjustments as sort of a first run-through to see the magnitude of the problem. There is also an inter-provincial group of legislative councils who met recently in Victoria and they have set up a subgroup to look into this area. We will have

to get our own legislative council group to work with us pretty intensely and to decide how the adjustments will take place, how the corrections will take place in each regulation and in each Act. There are obviously a number of alternatives which can be done, slowly perhaps in many instances, but in some, in those sensitive areas like land, like taxes and so on, adjustments will obviously have to be made at once whenever that date is decided upon and it will have to be clear. There can't be the question of a municipality coming to the provincial government saying, "Hey, did you amend that one? And how about this one over here?" So that, I think it is fairly obvious at this stage that a general bill will have to be prepared and part of that general bill will have to include some definition and some of the basic adjustments, and at present we have no idea what particular form that bill will take nor, indeed, the timing of it.

Now, the other area that we are interested in, or forced to be interested in, is that of consumers. We hear a lot of talk about meat prices and so on, food prices in general, spaghetti. There is obviously going to have to be a good program aimed at the consumer to ensure that the consumer is not confused and to ensure that the consumer does not think that they are being taken by adjustments being made over to the metric units. I am not sure at this stage what role the province will take vis-a-vis the federal government but it is our committee's reading of the situation at this stage that by and large what the provincial groups will do will be to fill the gaps that are left in the federal program, and those gaps may be either because we have specific interests, that is not a national interest, or because we just straight feel that we want to do a better job in a particular area than the federal program was designed to do from any standpoint. When I am talking about special interests in Alberta, it may be in agriculture. We may decide that the federal program because of its national character does not give enough emphasis to the cattle-buying situation perhaps. Saskatchewan may hit the wheat bill; so may we, or grain. Alberta may decide that the oil and gas industry is one that is particularly sensitive and therefore we may have to spend time and dollars in that area making sure that there is complete and clear understanding of what is going on there. But that is really the general intention, to fill these gaps and it is not going to be particularly easy because we really have to follow the federal government's lead in this case. There is no particular benefit in being a hero and leading the pack as far as metric conversion goes because you might be running in the wrong direction and everybody else follows behind you and goes on. You've got nine other provinces going off in a different direction. You really have not spent your time, energy and money in a worthwhile way. And I think this is particularly very true in some educational areas.

Now, I think I will really wind it up by not saying some of the obvious things like we need a training program inside the government and things like this, but just by saying that I do not view metric conversion as a particularly wrenching thing to society in Canada. I think it is interesting. I think it is important. I think it is going to save money

in the long run and save the confusion of our present system where the foot is based on how long a king's foot was at a particular point in history and so on. I think it is going to be much less confusing when a shopper can look at them quickly in her mind and divide by 10 and she knows where she is at as far as the product on the shelf is concerned. I think the system is going to be aided by the adjustment to standards in Canada that will run parallel with the conversion to the metric system, and fortunately these groups do get together under the Metric Commission and are working very well. They are putting together a network plan that is just really being born with initial birth pangs right now. But it is the only country in the world that is going to convert to the metric system using a network plan. Australia is in the middle of it now but not using the network programming, it is not using the computer to help itself. We have talked to the Metric Commission about utilizing their program when it has been developed and it is anticipated that this province, at least, will develop its own network plan, utilizing the federal model and it is always nice for somebody else to develop something for you that you can utilize and we plan to do that. Two members of my staff are going down to Ottawa to talk about this, among other things, in the first part of November, but that one in particular, because when we look at it, it is very difficult to handle the problem in any other way than using something with the speed and ability that a computer can give you.

So that I am not particularly scared of what is going to happen, is the point I am trying to make. I think it is going to be a slow process but it grows on people and it is not going to be that wrenching, future-shock sort of situation.

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Questions from the floor

Q. There has been a suggestion that there is possible confusion that could develop and particularly in light of the fact that we use the expression "conversion to the metric system" without specifically making reference to the SI system. Could you comment on this?

A. Yes. Well, it is a real problem. We, of course, would not do anything to alleviate the problem if we used words that were different from those that the federal government used, thereby confusing it further in Canada. The Commission is coming up with a symbol that is being worked on right now, that everybody can use and the appropriate words to go along with it. Right now there is quite a wide spread to the words "SI". The mapping and surveying people are ahead of a lot of others in converting to the use of SI - but that is a technical group. It doesn't hit the public and it is

the kind of language they (surveyors) are at home with. But I think SI to the members of the general public and to a chap like me who has no particular discipline that relates to metric conversion - (I do not have anything that I am interested in work-wise relating to metric conversion other than the fact that I am responsible for a committee). I think they are probably more at home with metric conversion than SI because SI sounds sort of like 1984, but the only point I can make, I guess, is that the Commission is going to have to wrestle with this problem and come up with the answer and then all provinces had better follow suit or they will be sorry that they didn't.

Q. What will be done re price per unit? E.G. cents per pound versus cents per ounces?

A. I presume you are talking about packaging standardization really, are you? O.K. You are talking about 30 cents per pound, or 5 cents per ounce. I am sorry, but I do not know the answer to that question. (Claude, do you know?) This would come from the standards side rather than the metric commission side, really, and we are certainly talking about getting into areas like that and especially getting into them if they would at this time aid what we are trying to do re metric conversion. And it would seem to me to be a very logical step, but in the interim you are going to have to have two units shown on your packaging. Well, it would be a great help to the consumer, I would think, if you can identify your pricing on a unit basis under both systems and eventually swing only to the one. This sort of thing was discussed but not that specific problem at the last committee meeting, but many things around it were discussed and anything like that that was discussed was viewed as a good thing to do. So perhaps we will get to it.

Q. What is the provincial prerogative in the actual regulation of packaging?

A. That is certainly broadening the question in relation to milk cartons. The province could get into that but it is not anticipated that they do at this time. But I would like to bring you back to a point that I am sure was made this morning, that it is a voluntary system. I had originally thought that because Australia was going so well that it was a mandatory system. It is not. It is a voluntary system. They seem to be doing quite well. They seem to be able to do things like this, such as talking to the milk producers and agreeing to a timetable with them. I think that it is a good example because it is the kind of product that hits everybody; like toothpaste, it hits everybody. And it seems to make sense to have a few leaders like this that get people thinking in metric terms at an early stage. But I can't see that early stage being too far ahead of the balance of the system coming into place, as I can't see the whole Canadian conversion going too far ahead of

the Americans because, while it makes sense to do it ahead of them, when we are talking about converting ahead of them, we are talking in a matter of weeks or months. In the forest industry they are our largest customer. Now, if we go ahead and convert our forest industry over to metric and the States doesn't do it until a year later, we put our export position in jeopardy just by straight confusing our customers down there. So I think milk is a very good example of - I guess I would liken it to an opinion leader - and it may be used but it will be used on a voluntary basis after agreement with the association.

Q. Why are we doing it besides just following the federal government?

A. Why are we doing it besides just following the federal government? I presume you heard this morning some of the reasons because, as I understand it, there was a fair amount of historical perspective put in Mr. Gossage's remarks. However, I think that there were some very basic and simple reasons for doing it. One is that Canada is more and more becoming an international marketer of goods rather than marketing its goods to England and the States as its primary importers of its materials. When you start to get countries like Japan and so on as importers of our products in a major way, then it becomes important to have our systems coincide with theirs. The best example of this right now is in the wood industry where our standards for wood products are completely different from Japan's, and Alberta has been working quite hard for the last little while to try and get their standards together because the end result is going to be quite a measurable expansion in their ability to absorb our products.

Another reason is that it just makes straight economic sense to simplify the numbers of categories for products you have to produce and here we are thinking about the nuts and bolts in the auto industry and the farm implement manufacturing in all of these areas where it makes sense from the dollar standpoint.

There have been some people who have tried to project the cost. Ontario tried to project the cost to Ontario. They got completely lost in trying to come up with real costs but what they did come up with was a very clear statement that the pay-back period would be extremely short. We are talking of a matter of just a few years that the pay-back period will occur.

Now, when you start saying these things, people start thinking, "My God, we are going to convert on December 1 and we are going to start saving money on December 2." You can't help but have this thinking pop into your mind because it is hard to set your mind to thinking in a sort of way Gerry Hawley was talking about where we have a number of sectors and they are not all going to go the same way at the same time. Now, I think this is the biggest reason

why we are going to the network planning. We are not necessarily wanting them all to go at the same time, but we want to know where one is going in respect to another, so we will know whether we should ask them to speed up or slow down. If the container industry is either ahead of or behind the milk industry, they are going to be in trouble because they are getting all geared up for putting out metric milk and there is nobody to give them the packages. So, it has to work in line or the darn milk carton dispensers in the grocery store won't accommodate metric cartons. They all have to go in line and it all sounds like just straight expenditure of dollars, but in the end it won't be because by going the metric route what you are automatically doing is doing the B problem to your standardizing. Automatically, at the same time you are standardizing and it is there the savings are and if you are standardizing and picking up those savings you are also able to pick up the savings by working in the same system that your customers are working in.

Q. Can you tell me how many professions, (and I use that word in its loosest of terms), are presently using the metric system of measurement in their everyday activities?

A. Well, there is the convenience aspect that I alluded to earlier with the consumer and so on, but I do not think that there are that many that you can zero in on that are non-economic because if they are desirable, if they are convenient, they are also by and large economic. Now, I do not know how much discussion there has been about how many people are already using metric units but they are certainly using them in hospitals, engineering firms are using them, and if you need a new part in your tractor or your television set and the darn wrench won't fit, that is because it is a metric nut or bolt that is in there. And you will find that there is a large segment of the population that is already using it, but by and large it is in the scientific and engineering type of field. But I can't identify a reason other than just straight convenience that is non-economic.

Torgunrud - I think that is rather a significant issue and as I mentioned earlier in introductory remarks this morning that Toynbee, one of the internationally known historians, makes what to me is a very clear point that technologically we move ahead and oftentimes our technology is very closely connected to material gains. Yet, in education, one of our major thrusts is a social endeavour.

The arguments that have been given, and I think very accurately, by Mr. Vant are rather forceful on the technological side, but I would hope that it would also give us impetus and motivation in the day (tomorrow), when we look at principles and policies that we have before us, the whole sociological implications involved in this conversion which is before us.

I personally, and it does not necessarily originate with me, feel that this move with whatever motivational forces there are, is the tip only of the iceberg; that perhaps the next round might be on currency and that all of it has the concept of a one-world look. Now, where you stand in that kind of thinking I think it is important that in a democratic country we do have some diversity. But what I'm saying, in short, from where I see it, it is once again material gains, and this perhaps sounds like pretty blunt language, but I speak for myself. I do not speak for the government because I could not, but I do speak as one involved in education, that I would hope that we really hold well before us the fact that there are also the very social dimensions to mankind and we must do all in our power to beef up that particular dimension of the educational contribution in this area.

Dr. S. A. Lindstedt

Dr. Lindstedt served the province of Alberta for a number of years in the Curriculum Branch, as chairman of the elementary mathematics curriculum committee and later on in the field of junior high school mathematics. He has played an extremely active role with teacher education in the province and was very closely associated with the introduction of modern mathematics programs into the province. He is now at the University of Calgary where he has served as head of the Department of Curriculum Instruction. Currently, he is head of the Field Services.

CURRICULAR IMPLICATIONS

OF CONVERSION TO THE METRIC SYSTEM

S.A. Lindstedt
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This was an illustrated talk with extensive use of overhead projections (transparencies). Dr. Lindstedt used the following transparency as a "Table of Contents" for his presentation:

SCHOOL CURRICULUM
IMPLICATIONS OF METRICATION

1. *Basic Decision*
   "Think metric" or make comparison.
2. *Conceptualization of Measurement.*
3. *Scope and Sequence.*
4. *Conversions Within The Metric System.*
5. *Decimal Notation for Fractional Parts*
6. *Counting Part of a Unit (Precision).*
7. *Relationships Among the Units.*
8. *Implications in Various Subjects.*
   Math, Science, Social Studies, et al.

I am always pleased to come to Edmonton; after all it's only 288 kilometres from Calgary and in a jet that goes over 1040 kilometres per hour it only takes about 2 kiloseconds. The jet engines by the way delivered about 1000 kilowatts each, enabling it to climb at about 0.7 radians. The pilot - a friendly sort - told us that we were cruising at an altitude of 9500 metres; the outside temperature was -23 degrees Celsius. Of course inside the plane it was a pleasant 20 degrees Celsius with a normal air pressure of 101 kilonewtons per square metre. A nice trip. We flew over hectare after hectare of rich farm land. The passengers behind me were farmers and I overheard one saying that even though there was only 18.25 centimetres of rain last year, yet his barley yielded over 1000 litres per hectare; he was going to feed it all to his cattle because they now are worth over a dollar per kilogram on the hoof. And, of course we had a very pretty stewardess who served coffee - a girl with a beautiful face and an almost perfect 91 - 63 - 93 figure. I tried to be friendly and during take-off I suggested that she share a seat belt with me - but she declined. Probably thought that I was the kind of fellow that, if you gave him a millimetre he would take a whole kilometre. So I had to content myself with talking to the lady beside me - a pleasant, jolly, talkative type. She wanted to know why a nice boy like me, was going to Edmonton and I told her that I was going to a meeting on metrication. She laughed and said, "Oh I tried that once, but it tasted just awful, so I joined weight-watchers instead."

Ladies and gentlemen, we are told that by 1980 Canada will be a metric country and everybody - well, at least some - will be using terminology such as the above. There is no doubt that the pupils in our elementary schools today will graduate into a metric world.

My assignment is to talk about the curricular implications of introducing the metric units of measurements into the school program.

SCHOOL CURRICULUM
IMPLICATIONS OF METRICATION

This is a curriculum development job. I think there is a basic initial decision to be made which is this: Should we introduce the metric system by a 100% immersion procedure or should we use a dual-system approach? Should we teach only the metric units on a "Think Metric" basis, or should we teach the comparison between metric and Imperial units?

1. BASIC DECISION, "THINK METRIC" OR MAKE COMPARISONS:

There is a fairly good consensus that we should use the 100% immersion method. The Canadian Teachers Federation, the Council of Ministers of Education, The National Council of Teachers of Mathematics, The Mathematics Association of America all have issued statements agreeing with this approach.

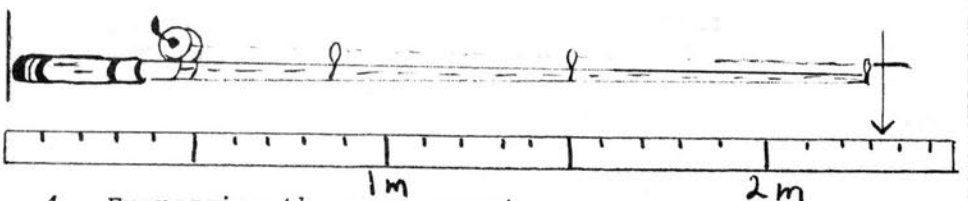
Let us assume then that we have made this decision to teach only metric units. How do you do this? The answer is very simple: we would teach measurement the way we have always taught measurement, but using metric units instead of Imperial units. Because of the change of units we would probably have a new look at the methodology to be sure that it does follow viable pedagogical principles. Let's look then at the conceptualization of measurement - conceptualization is a fancy word for "getting the idea".

2. CONCEPTUALIZATION OF MEASUREMENT:

To help the clarification of this topic, I have put down 4 steps or phases in the conceptualization of measurement. Here they are

CONCEPTUALIZATION OF MEASUREMENT

1. *An understanding of the attribute to be measured.*
   Length? Time? Capacity? Mass? Work? Power?
2. *The identification and selection of a unit which has that attribute.*
   Centimetre, second, litre, kilogram, joule, watt.
3. *Counting the units or parts of the unit, during "measuring".*



4. *Expressing the measurement*
   2m, 3 dm and 5 cm
   or 2.35 m
   or 23.5 dm
   or 235 cm

The first phase is to ensure that a child knows what is being measured. We measure different attributes, each distinct and discrete, for example, length which is one-dimensional, area which is two-dimensional, volume which has three dimensions, time, speed which combines length and time, force, work, power, pressure which combines force and area. Confusion as to what is being measured leads to very muddled thinking. Now we teach this phase by using many examples - length refers to our height, the width of the room, how far we can step, how high we can jump, the distance to the zoo or to the movie, how long the worm is, the thickness of a book, the distance around the yard. We sharpen understanding of the attribute by comparisons - John is taller than Jim, it is further to Toronto than to Winnipeg. Further understanding is developed by arranging objects in order according to some attribute such as arranging rods in order of length.

The next phase is the identification and selection of a unit that has the same attribute as the one being measured. You use a tooth-pick, or a bobby-pin, or a piece of string or a broom handle to measure length, because they have the attribute of length. We often begin with non-standard units such as toothpicks to accentuate the understanding of what we are measuring. However, we soon discover the inadequacies of non-standard units and introduce standard units. It is at this point that we would use metric standard units instead of Imperial units - we would, for example, introduce the centimetre instead of the inch, the kilogram instead of the pound.

The third phase is measuring. Measuring involves counting the units. In every case we are faced with the problem of counting part of a unit. In this illustration (referring to transparency) the fishing pole is 2 metres and a part of a third metre long. We must teach (and learn) how to count that part of a unit and we will find out that the metric system uses decimals to count part of a unit rather than fractions. Of course in most cases we have scales, or dials or rulers, or clock faces to help us "count" the units.

Finally, as phase four, we express the measurement and we can always do this in several synonymous ways. The length of this pole (referring to transparency) "Two metres, three decimetres and five centimetres" or "two point three, five metres" or "twenty-three point five decimetres" or "two hundred, thirty-five centimetres." Each expression gives the same measurement.

The next topic I would like to consider is scope and sequence.

3. SCOPE AND SEQUENCE:

In designing a curriculum in any subject area, once you have made certain basic decisions and once you have an idea of the methodology that you are going to use, it is necessary to map out the whole field for scope and sequence.
(See the following page for the Scope and Sequence chart that was shown on the screen).

This is one suggestion for a scope and sequence organization for the measurement strand in an elementary school program. Let us consider as an example the scope and sequence for linear measurement. In grade one we would begin with non-standard units - toothpicks, paper clips, broom handles - to develop the idea of what length is. Then we would introduce a standard unit - the centimetre - and proceed to use it to measure many, many lengths in the classroom.

In grade 2 we would introduce a larger unit - 10 times as large as the centimetre - the decimetre and use it to measure longer lengths in the classroom. We would introduce the idea that there are alternate ways to express the same measurement e.g. the length of a book might be 2 decimetres and 8 centimetres long, or 28 centimetres long or 2.8 decimetres long.

In grade 3 we would go to a still larger unit - 10 times the decimetre, or 100 times the centimetre - the metre, and now the pupils would measure longer lengths such as the dimensions of the classroom in metres, decimetres and centimetres. The width of the room might be 4 metres, 2 decimetres and 5 centimetres; this could be expressed as 425 centimetres or as 4.25 metres.

We would next go to larger units used to measure road distances - the kilometre, which is 1000 times as long as a metre. And then we would go to a very small unit of length - the millimetre, which is one-thousandth of a metre. And of course we would have appropriate exercises for using these units.

THE MEASUREMENT STRAND IN ELEMENTARY MATHEMATICS

SCOPE AND SEQUENCE

SEQUENCE

Kindergarten

SCOPE

1. Activities that involve making comparisons - long, short; thick, thin; tall, taller; heavy, light; warm, warmer; big, small; etc.
2. Ordering a set of objects by some measure attribute, especially by length.
3. Use of non-standard units.

LINEAR

1. Non-standard units - tooth picks, paper clips
2. Standard unit - The centimetre (cm)
   (a) Familiarization
   (b) Centimetre scale (ruler)
   (c) Measuring to nearer centimetre
3. Standard unit - The decimetre (dm)
   (a) Familiarization
   (b) Decimetre scale
   (c) Measuring using dm and cm
   (d) Decimal notation to one place of decimal, eg. for "1 dm and 3 cm" write "1.3 dm" and say "one point three decimetres"
4. Standard unit - The metre (m)
   (a) Familiarization
   (b) Metre scale
   (c) Measuring using m, dm and cm
   (d) Decimal notation to two places of decimal, eg. for "7 m, 4 dm, 2 cm" write "7.42 m" and say "seven point four, two metres"
5. Standard unit - The kilometre (km)
   (a) Familiarization
   (b) Road maps, etc.
6. Standard unit - The millimetre (mm)
   (a) Familiarization
   (b) Measuring to precision of nearer millimetre
   (c) Decimal notation of three places of decimal, eg. for "3 m, 0 dm, 6 cm, 5 mm" write "3.065 m" and say "three point zero, six, five metres"
7. Standard units - The hectometre (hm) and The decametre (dam)
   (a) Familiarization
   (b) Measuring fields, etc.
   (c) Scale drawings (road maps)
   (d) Decimal notation to three places of decimal, eg. for "6 km, 5 dm, 0 dam, 2 m" write "6.502 km" and say "six point five, zero, two kilometres"
8. Using linear units to show metric system from "milli-" to "kilo-"
   (a) Decimalization
   (b) Conversion of units by shifting decimal point
   (c) Consideration of "ragged decimals"
   (d) Precision

AREA

1. Meaning
   (a) Use of non-standard units
   (b) "Counting" units of area
2. Standard unit - The square centimetre (cm^2)
   (a) Familiarization
   (b) Measuring area of regions by "counting" square centimetres
3. Finding area of irregular regions by counting square centimetres
4. Area of rectangles
   (a) Length X width formula
5. Standard unit - The square metre (m^2)
6. Land areas - The hectare (ha)
7. Area of right triangles

VOLUME

1. Meaning
   (a) Rectangular prisms
   (b) Use of non-standard units
2. Standard unit - The cubic centimetre (cm^3)
   (a) Familiarization
   (b) Measuring volume by "counting" cubes
3. Standard unit - The cubic decimetre (dm^3) (relationship to a litre)
4. Volume of rectangular prisms
   (a) Length X width X height formula.
5. Standard unit - The cubic metre (m^3)

CAPACITY

1. Non-standard units - cups, cans, bottles
2. Standard unit - The litre (ℓ)
   (a) Familiarization
   (b) Measuring with a litre
3. Standard unit - The decilitre ($d\ell$)
   (a) Familiarization
   (b) Measuring with litres and decilitres
4. Use of 5 $d\ell$ containers
5. Standard unit - The millilitre ($m\ell$)
   (a) Familiarization
   (b) Relationships to cm^3
6. Relationship of a litre to a cubic decimetre
7. Standard unit - The kilolitre ($k\ell$)
   (a) Familiarization
   (b) Relationship to a cubic metre

MASS

1. Meaning
   (a) Examples
   (b) Comparisons
2. Standard units - The kilogram (kg), (large) The gram (g), (small)
   (a) Familiarization
   (b) Appropriate unit selection
   (c) Measuring
3. Reading a scale eg. "2.7 kg" means "2 kilograms and 700 grams"
4. Standard unit - The milligram (mg)
   (a) Familiarization
   (b) Uses
5. Standard unit - The megagram (Mg) 1 tonne (t)
   (a) Uses

TEMPERATURE

1. Meaning
2. Celsius scale
3. Common temperatures
4. Reading a celsius scale
5. Computing changes in temperature
6. Reading a celsius scale to one place of decimal (clinical therm)

INTERRELATIONSHIPS

(Activities and problems involving interrelationships among different measurement attributes)

1 cm	⟷	1 cm^2	⟷	1 cm^3	⟷ 1 $m\ell$	⟷ 1 g (water)
10 cm	⟷	100 cm^2	⟷	1000 cm^3	⟷ 1 ℓ	⟷ 1 kg (water)
1 dm	⟷	1 dm^2	⟷	1 dm^3	⟷ 1 $k\ell$	⟷ 1 kg (water)
1 m	⟷	1 m^2	⟷	1 m^3	⟷ 1 $k\ell$	⟷ 1 Mg = 1 t (metric ton)
10 m (1 dam)	⟷	100 m^2 (1 dam^2) = 1 are				
100 m (1 hm)	⟷	10000 m^2 (1 hm^2) = 1 ha				

End of Elementary

Finally we would teach the other units of length - the decametre which is 10 times the length of a metre and the hectometre which is 100 times the length of a metre - in order to present a complete system of units from milli units to kilo units - millimetres to kilometres. At this point we could teach the complete system of metric units of length to show how the metric system is based upon powers of ten. The pupil would now know and understand decimal notation and the meaning of the prefixes milli-, centi-, deci-, deca-, hecto-, and kilo-.

I have dealt in some detail with the linear units. We would treat other attributes such as area, volume, capacity, mass, temperature in a similar way with more emphasis on the commonly used units.

I would like to discuss a little more the use of the powers of ten in the metric system. The units within one particular attribute, such as length, are organized according to the powers of ten which means that the conversion from big units to smaller ones, or from small ones to bigger ones, can be done with great facility.

4. CONVERSIONS WITHIN THE METRIC SYSTEM:

Let me give you an example. The length of a football field is 110 yards. Using a conversion factor I have calculated that this is 100.584 metres.

(Display transparency showing only:

CONVERSIONS WITHIN THE METRIC SYSTEM

Consider the length of a Football field

(110 yds. = 110 x 0.9144 = 100.584 m)

100.584 metres.

Now if we want to express this length in other units all we have to do is to repeat the same digits, 1, 0, 0, 5, 8, 4, and move the decimal point to the appropriate position.

(Use overlays on transparency to show):

CONVERSION WITHIN THE METRIC SYSTEM

Consider the length of a Football Field

110 yds. = 110 x 0.9144 = 100.584 m

100584	*millimetres*
10058.4	*centimetres*
1005.84	*decimetres*
100.584	*metres*
10.0584	*decametres*
1.00584	*hectometres*
0.100584	*kilometres*

"Presto..." in one full swoop we have made the conversion to express the length of the football field in millimetres, centimetres, decimetres, metres, decametres, hectometres and kilometres. (I'm not sure why anyone would want to know the length of a football field to the nearest millimetre - although I appreciate that last year the Calgary Stampeders had some difficulty in moving the ball even one millimetre in 3 downs!).

The important point here is the relationship between the metric units and the decimal system. Let's discuss this further:

5. DECIMAL NOTATION FOR FRACTIONAL PARTS:

From the curricular aspect, we should not ignore the fact that the metric system is a decimal system; we should exploit it. It probably means that we would introduce decimal notation into our school program at an earlier grade level. We could, for example, introduce the first place of decimal in dealing with a measurement

such as 2 decimetres and 8 centimetres and calling it "Two point eight decimetres." We could introduce the second place of decimal when we use a measurement such as 4 metres, 2 decimetres and 5 centimetres by calling it "Four point two, five metres." (We have a parallel situation in money notation - four dollars and twenty five cents is written as $4.25. This means that we would have good referents for decimal notation - we would use the decimals in specific context.)

Now, if we are going to emphasize the decimal system, the question comes up whether or not we can ignore and discard the common fraction notation. I think the answer is that we can certainly de-emphasize common fractions but that we cannot completely discard them. We need them for certain definitions and operations in the so-called rational number domain. However, aside from their use in number theory, the application of common fractions in everyday life would sharply diminish. Most of the application of fractions in the big, wide world about us is in measurement problems where we need to use part of a unit. With metric units, part of a unit becomes the first, second or third place of decimal, rather than a common fraction.

Counting part of a unit brings us directly into a consideration of precision of measurement.

6. COUNTING PART OF A UNIT (PRECISION):

First of all we need to understand that all measurements made by man are approximations. Unless you happen to be measuring a particular piece of metal, with two scratches on either end, housed at the International Bureau of Weights and Measure and defining exactly a metre, all measurements of length are only ascertained to a certain degree of precision.

Suppose I want to measure my height to a fairly fine degree of precision. With English units a first rough approximation would be 2 yards and a bit more. To be more precise, I find that the "bit more" is less than a foot, so my height is 2 yards, 0 feet, to the nearer foot. For further precision we go to inches - my height is 2 yards, 0 feet, 3 inches to the nearer inch. If I want even greater precision I would go to fractional parts of an inch - to halves, quarters, eighths, etc. Let's settle for a measurement of 2 yards, 0 feet, 3 1/8 inches to the nearer eighth of an inch.

Using the metric system and the same modus operandi I would arrive at the measurement of 1 metre, 9 decimetres, 0 centimetres and 8 millimetres, to the nearer millimetre. This measurement can readily be converted to 1.908 metres, which clearly shows the precision. This notation is considerably less awkward than the English units notation. (By the way the precision of 1 millimetre is much greater than one-eighth of an inch). The metric system facilitates the idea of precision of a measurement - we simply go to "the next place of decimal" until we get the required precision.

This idea of precision carries over into the "rounding off" of numbers, into the question of "significant digits," the use of so-called "ragged decimals" and finally the use of "scientific notation." It is an important idea with many ramifications; with the metric system of units, perhaps we can make it more understandable.

One of the very elegant characteristics of the metric system is the interrelationship among units of different attributes.

7. *RELATIONSHIPS AMONG THE UNITS:*

RELATIONSHIPS AMONG UNITS OF DIFFERENT ATTRIBUTES

Linear	*Area*	*Volume*	*Capacity*	*Mass*	
1 cm	$\longrightarrow$ 1 cm^2	$\longrightarrow$ 1 cm^3	$\longrightarrow$ 1 mℓ	$\longrightarrow$ 1 g	(of water)
1 dm	$\longrightarrow$ 1 dm^2	$\longrightarrow$ 1 dm^3	$\longrightarrow$ 1 ℓ	$\longrightarrow$ 1 kg	"
1 m	$\longrightarrow$ 1 m^2	$\longrightarrow$ 1 m^3	$\longrightarrow$ 1 kℓ	$\longrightarrow$ 1 t	"
1 dam	$\longrightarrow$ 1 dam^2	$\longrightarrow$ 1 a			
1 hm	$\longrightarrow$ 1 hm^2	$\longrightarrow$ 1 ha			

There is a coherent one-to-one relationship between units of length, area, volume, capacity and mass of water as shown by these examples. These relationships greatly simplify calculations that involve more than one attribute.

Finally let us consider some broader implications of using metric units - the implications for other subject areas besides math, and science.

8. *IMPLICATIONS IN VARIOUS SUBJECTS, MATH., SCIENCE SOCIAL STUDIES, ET AL:*

One important aspect of metrication is that it is world-wide. Based on the "Système International d'Unités" (S.I.) conventions adopted in Paris in 1960, the metric system will be an international means of communication. Let us look at some of these world-wide conventions. (Show transparency)

SEVEN BASIC SI UNITS.

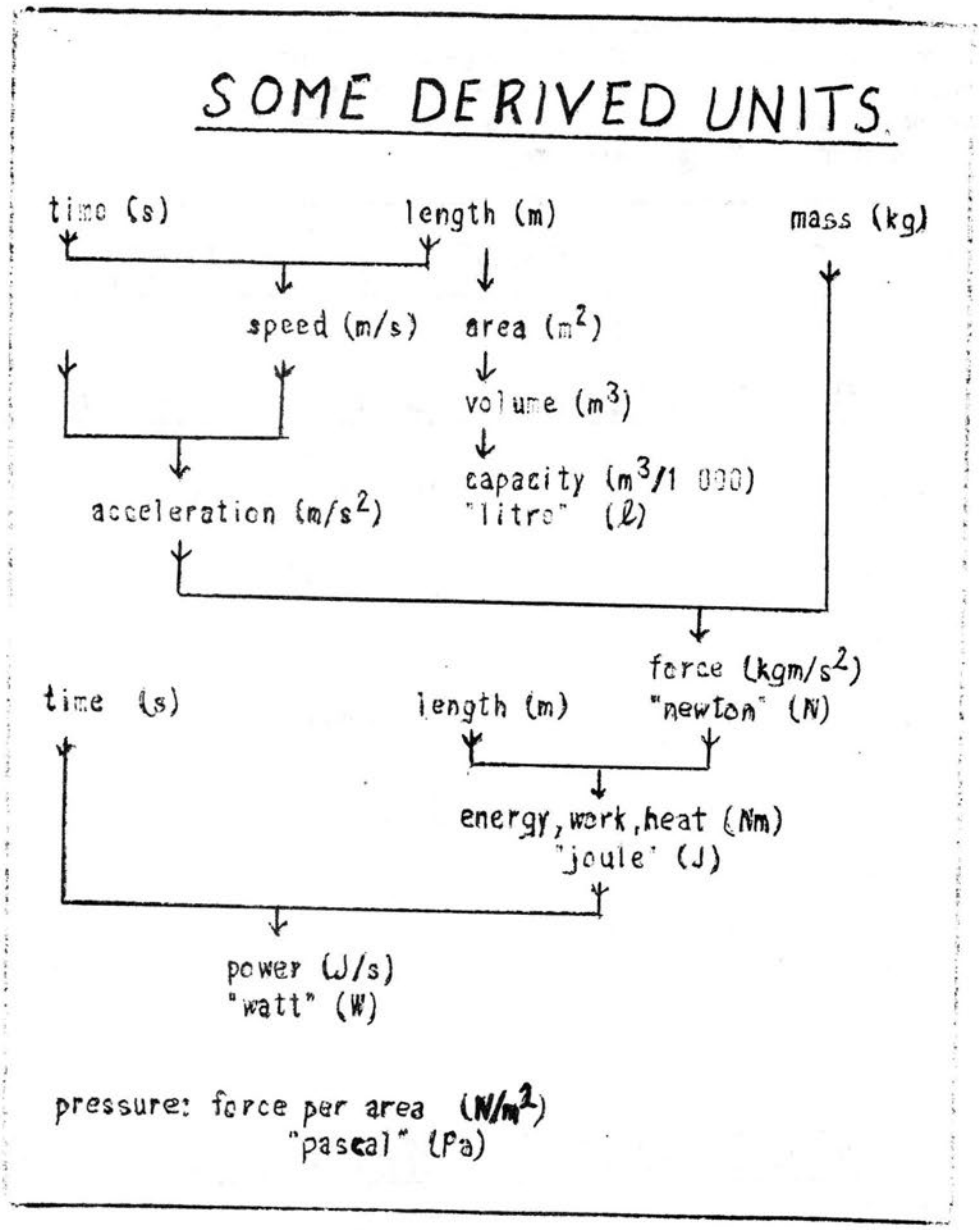
Attribute	Name	Symbol
1. Of length	the metre	m
2. Of mass	the kilogram	kg
3. Of time	the second	s
4. Of electric current	the ampere	A
5. Of temperature	the kelvin	K
6. Of light intensity	the candela	cd
7. Of modular substance	the mole	mol

TWO SUPPLEMENTARY UNITS

1. Of a plan angle	the radian	rad, ($\_\_^r$)
2. Of a solid angle	the steradian	sr

The whole system of units is based on these 7 units plus these 2 supplementary units. Each unit has been carefully defined. The symbols are common for the whole world.

From these 7 basic units, other units are "derived". (Show transparency)



This chart shows how other units may be derived from the 3 basic units of time, length and mass. Many of these derivations are so important that they have been given labels and symbols of their own such as litre (ℓ), newton (N), joule (J), watt (W) and pascal (Pa).

For all of these units, basic or derived, sub units within the same attribute are produced by using a set of prefixes. (Show transparency).

SI PREFIXES

Prefix.	Multiplying factor	Symbol
tera-	10^{12}	T
giga-	10^{9}	G
mega-	10^{6}	M
kilo-	10^{3}	k
hecto-	10^{2}	h
deca-	10^{1}	da
deci-	10^{-1}	d
centi-	10^{-2}	c
milli-	10^{-3}	m
micro-	10^{-6}	μ
nano-	10^{-9}	n
pico-	10^{-12}	p
famto-	10^{-15}	f
atto-	10^{-18}	a

These prefixes may be applied to metres, to litres, to grams. The prefixes always have the same meaning. The 6 in the middle are separated out because they are the more commonly used ones.

There are other world-wide conventions that have been adopted as concomitant considerations of the metric system. (Show transparency).

World-Wide Conventions.

The International Organization for Standardization Recommendation R1000. (1969)

Symbols:

mm,	cm,	dm,	metre,	m	dam,	hm, km
mℓ,		dℓ,	litre,	ℓ		kℓ
mg,			gram,	g		kg

A symbol is not an abbreviation; not followed by a period; not pluralized; has a space between numeral and symbol. (E.g. 152 g)

Decimal Notation

Spaces, not commas, between periods of 3 digits, (E.g. 6 946 572)
Decimal point is period or comma
initial zero before decimal point for numbers < 1. (E.g. 0.54, $0.75)

These are then some very wide implications that should improve understanding and communication on a world-wide scale.

In summary what are the implications of metrication for school programs? This final transparency points out a few that I think are especially important.
(Show transparency).

CURRICULAR IMPLICATIONS - SUMMARY

1. *Reinforcement of base 10 numeration system.*
2. *More emphasis, and earlier, on decimals.*
3. *Easier conversions within the system.*
4. *Greater understanding of precision.*
5. *World-wide conventions for symbolization.*
6. *Some useful relationships among units.*
7. *Expedite and facilitate scientific notation.*
8. *And the greatest of these -*

   clear, rational and precise thinking.

Note: Reprints of Dr. Lindstedt's presentation may be obtained through:

Dr. S. A. Lindstedt
Regional Office of Education
332 - 6th Avenue, S. E.
CALGARY, Alberta

Panel of Reactors

Mrs. Audrey Agar is vice-president of the Chestermere Local of the Home & School Association, and is representing the Alberta Federation of Home & School Associations.

Mr. Les Turner is representing the Alberta Chamber of Commerce. Mr. Turner comes to us from the U.K. where he served in aeronautical engineering until 1966 when the Alberta government recruited him to come to the Northern Alberta Institute of Technology. He is now at NAIT where he is currently head of the Industrial Practices Section of that institution. Mr. Turner is also serving as a member of the APEGGE (Alberta Association of Professional Engineers, Geologists and Geophysists) committee on metric conversion.

Mr. Jim Jeffrey, a member of the Department of Education staff, was mathematics consultant in the Regional Office of Education in Grande Prairie.

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Mr. L. W. Turner

Industry in Alberta is biased towards resource extraction, and in these industries, capital equipment has a very long life. Retroactive metric conversion cannot, generally, economically be justified. For this reason I foresee a very protracted conversion period in the extraction and allied resource industries. The implication here is that these industries are going to require, and I consider this unfortunate but I am sure that is how it will be, they are going to require a labour force with Imperial knowledge, or at least ability to work with Imperial units for a very long time. These plants have typically 30-year lives. Some now at feasibility stage will not come on stream until 1983 and then will most likely be Imperial unit plants still. So you put 30 years on top of 1983 and you are looking a long way down the road. Now, it is certain that the educational system will be turning out a metric product by about 1985. So this means that these companies who are still operating as Imperial unit plants will have to re-educate, or I might say uneducate, their new staff to a certain extent and organize them to work in an Imperial unit environment. This is going to put their operating costs up because they are going to have to set up in-plant training schemes but, nonetheless, once they have built an Imperial plant, they are stuck with it and they are going to have to live with some retraining of new operators. I can say it is unfortunate, but the hardware, metric hardware, to build these plants just is not available, readily available, at the moment and delivery times on metric hardware to these plants is very, very long and by no means certain. So that

is how I see the resource industry sort of basically functioning for some considerable time. That is possibly so much what I personally consider a rather gloomy forecast on metric implementation.

The second large industrial effort is concerned with the service industries and includes merchandising, installation and repair of all commercial, consumer durable products. These range from 4-side computers right down to office equipment lines, automobiles, complete lines of machine tools and all the goodies which we have in the household these days that seem essential to modern life. The rate of metrication in this sector is not within provincial control and is possibly not even within federal control, I consider. It is more likely that it will be dictated by the manufacturers in central and eastern Canada, most of whom are subsidiaries of American multi-national companies, and almost without exception these companies have complete metric standards readily available to them, and also in most cases, already manufacture a metric product in Europe. Now, the significance of having these standards available is you cannot manufacture a product until you have standards that the small companies are required to have and they normally operate from national standards which, in Canada, are developed by CSA. The large companies can take on block even international standards or usually develop their own standards which very often are slightly tighter than national standards. It takes a long time to develop these standards. The lead time from when you develop a standard to manufacturing a product can quite likely be - you are looking at seven, eight, nine years - so there is a big significance in the rate at which we develop national metric standards. And I feel that the way it is going at the moment the big multi-national companies have metric standards available to them and can quickly switch into metric production and the smaller companies who have not got these standards available to them are quite likely to fall behind. In fact, they might not get into the market place with a metric product.

So, I am trying to emphasize the significance of developing metric standards. Such leaders as IBM, General Motors, Ford, to name a few household names, have already announced quite publicly that all new designed work and developments will be in metric standards from now on. Anybody with a Ford Pinto knows they have a metric engine in it. It came from Europe and this is the way these companies operate. They make an engine in one plant, they ship it to various other countries in the world to put it into various cars they manufacture. And when they can do this completely metric throughout the world, they are going to be that much happier. That is the way they are moving. You often hear people talking about the rationalization of products which essentially means product reduction of varieties. You take Ford, they metricated their fasteners in 1971 (this is all the screwed fasteners that go into the Ford cars in U.K.), they metricated the screwed fasteners and they reduced the number of screwed fasteners they had to make by 75 percent and, in the process of doing it, they kept fairly good accounting on their last year of Imperial working and the first year of metric working

and they saved $7,000,000 on fasteners. Now this is money to anybody. And this is the sort of thing that will accumulate from every year on, a potential saving of $7,000,000 on fasteners every year from now on because they rationalize on metrication. So this is the sort of money that big industry has to look at to save and this is why the big companies will be very anxious to do it. I foresee that to meet this influx of metricated products which the big companies will be starting to market, I think in Canada by about 1976 onwards, you will see a progressively increased metric content in the products, and obviously, to meet this influx of metric components and products, the school leavers joining the labour force from about 1978 onwards will, what I consider, have to be bi-systems. This means that they are able to think, comprehend in Imperial or metric units as and when required. And after about 1985 they will be required more or less completely metric thinking and this excludes then the people who are still operating with Imperial units in companies. They are going to have to do some retraining that way.

A few words about the actual process of metrication, possibly. Metrication is a project-type undertaking and is a classical exercise in good management, the principles of which are: (1) required planning, (2) well-defined objectives, (3) budgetary control, (4) good communications, and (5) good timing of executive decision and implementation.

Countries which have more or less completed their conversion to teaching in SI have found, or claimed to have found, that they can save up to a half to one year of mathematics teaching time. Now this is not necessarily substantiated but there is good evidence to support it. What I would like to suggest is, what are we going to do with this saved time? And possibly there are some areas which may not currently be taught in mathematics curriculum to any great extent but which I feel in the future will have greater significance and I realize this is not in the topic area where Dr. Lindstedt spoke this afternoon because he was speaking of the lower grades, but I do feel that in the senior high schools some, and maybe even before that, some attempt at geometric progression should be put in. The mathematics topic of geometric progression is going to play an ever-important significance in all of our lives. The reason for it is this, that in the ISO systems of preferred or rationalized numbers they are all based on what is called preferred numbers or raynard numbers and they are all arranged in series which go in geometric progression. And this has a significant sort of effect on life in the future.

In the future almost all product ranges are going to be sized, packaged, ranged, and marketed in series which are in geometric progress and they are called "R" series. We would like to think that somewhere in the new mathematics curriculum there would be some deeper consideration than what is currently given to gecmetric progression. There are excellent examples. Right now in rationalization, every year at NAIT I send my students out to rationalize some product range in a store. I usually pick dry farm products because there is a good variety of these. Typically, if you go to a supermarket shelf, you can see on the

order of 40 to 50 such products marketed in different size packages. And you can rationalize these to about 9 or 10 sizes. The paper industry says they can't metricate. I say they can because they can cut their paper to 9 sizes instead of, as at the moment they are cutting up to 40 or 50 different sizes. And the cost reduction alone will pay for itself.

The other area I completely endorse. I did not realize that Dr. Lindstedt was going to come out so strongly in favour of SI and, in fact, de-emphasizing fractionalization, and I completely endorse what he has to say about it. I am sure that all of us here have spent many gruelling hours flogging over multiplying 47/64 x 23/64, and all this sort of stuff, and the sooner it goes, I think, the better.

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Mr. J. H. Jeffrey

One of the most important things Dr. Lindstedt said was concerning the basic decision - is it conversion, or is it immersion? You know, do we teach the metric system as a system that some people use and we might use, or do we teach it as though this is a system that you have to know because everybody else is using it and by golly you are going to use it? In other words, total immersion. The analogy is often made between the teaching of, I would rather say a second language, French, not a foreign language, where for years we taught it by the translation method but this was most ineffective because the students still persisted in thinking in English and translating into French. So it is immersion rather than conversion from one system to another.

Dr. Lindstedt of course stressed the logic, the simplicity, and so on, of the metric system as opposed to the cumbersome Imperial system, and rightly so, but perhaps we should emphasize this even more. Students have had to endure all kinds of computational monstrosities. You know if you think of a simple problem like finding, taking a cubical tank of 6 feet 9 1/2 inches on each side (why they would want to take a tank like that, I do not know) but take one and find the volume, find the liquid capacity and find the weight of the filled tank of water. Now, I won't bore you with the computations, but in the Imperial system you have umpteen lengthy multiplications and divisions. You have 250 numerals involved, 250 numerals, and in the metric units there are only 39 numerals involved, and one decimal point is moved. Now the average student will rejoice at this but let us think about the slow learner. The Imperial system of units is difficult enough for all of us here to comprehend, as Dr. Hrabi said, maybe no one ever really comprehends it, but when you think of the slow learner who finds it terribly difficult not only to learn this system but to apply it, we can see many, many benefits there. The drudgery is going to be taken out of math. What is going to be done with the time saved? We won't quibble about how

much time is going to be saved, but I do not think we are going to see the shortening of time spent on mathematics, heaven forbid! I am sure Dr. Lindstedt would second that. Mr. Turner mentioned the more practical aspects of mathematics that could be dealt with. I agree there. But then there are other aspects. The aesthetics, the recreational aspects of mathematics. Once again mathematics could be fun. I correct that as that might imply that those who brought in the new math took the fun out of math. I don't mean that, but what I mean is more fun.

Of course, there are many, many problems. It is all right to devise a curriculum that will be in keeping with the new system but then devising a curriculum and seeing it implemented, well, these are two different things. I know later on in the course of the sessions, tomorrow, we are going to look at these things, the problems of materials, textbooks, and even things like draft paper. We are going to have to have that in squares, in centimetres, rather than inches and fractions of inches. Maps will have to be with metric grids and distances in metric units. Also, teachers will have to be prepared. How ready they are is a matter of conjecture. The National Education Association down in the States polled its members and about 50 percent of the elementary and senior high school teachers felt that they were quite unprepared to tackle the teaching of the metric system. Personally, I feel that they were worried about something unnecessarily.

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Mrs. D. G. Agar

As just a plain ordinary housewife, as I always put my category, a parent, a concerned person in education, I would say "thank you" for the presentation that we were given. If every teacher were as capable of putting across a point as Dr. Lindstedt was, we would have no problems with our children and their learning. Neither would we, as parents, have any problem with the teachers. But we aren't all that privileged, I am sorry to say. As for the parents in our area and those I have talked to, some shrug their shoulders and say, "This is what has been forced upon us, we have to accept it". There are those that say, "We understand it, we know that we will have to learn it and we will". There are those that have come from the European countries and welcome it with open arms. There are others that travel quite widely and they can hardly wait until it gets here that we go on the metric system. As for the school children, they find it quite simple, and I have talked to many of them; and so as a parent, I would say, welcome the metric system!

SUMMARY AND IMPLICATIONS

G.B. Hawley, Department of Education

Topics for Discussion Groups

Four major issues in terms of discussion -

1. Teacher in-service and preservice
2. Implications for program and curriculum materials
3. Whether or not we adopt the immersion or transition kind of approach and what kind of realistic timelines there might be toward this matter
4. Delineate first of all what costs are legitimately to be incurred

Questions from the floor

Q. Is there to be direction from the province to register as simple a thing as the feedback from this conference and what the feedback will result in in terms of some concrete guidelines as to the next step for provincial development?

A. I see this conference as providing a real catalyst for the formation and I think that this current school year really is seen as the time in which these kinds of things, and part of these may be formulated, but right now we have no specific guidelines in terms of time established, I think, for a number of reasons. I would hope that the suggestions and recommendations coming from today will help us a great deal in structuring that kind of thing that you are asking.

Q. As far as budgets are concerned and school systems are already thinking about them, and again whether there is going to be some direct source of guidelines. For instance, I am thinking of some sort of things that Miss Chapdelaine mentioned where certain provinces have started talking about September 1974 for grades 1 and 2, and Manitoba has come up with a list of materials and so on. Is this going to be left more or less to the discretion of each of the jurisdictions, or will there be some general guidelines regarding the conversion to the metric system?

A. Well, let me describe it this way, and Dr. Torgunrud may want to either demolish what I say or add to it, but I would suggest that

in determination of such guidelines as will be determined over the next short time, that fairly serious consideration will be given to the budget planning process of local boards, for example, and that we would, I hope, not suggest guidelines and timelines that would be in direct conflict or would make the money problem locally in terms of providing in the local budget some for needed activities a great hardship, that is, in terms of the planning process.

Q. Do you believe there is a chance that some kind of materials will be available for use in grade 1 for September?

A. Actually, some sort of decision has to be made before March or April if you are thinking of September 1974, otherwise forget it, because you won't get the money until September of 1975.

Q. What kind of material will be available that would be useful for grade 1 classroom situations?

A. British Columbia has been negotiating with four publishing firms and it is their intention to be moving into adoption of programs at Division I, it is my understanding, and then moving on to Division II. So this will be on the market. Now, whether there will, in your question is also implied whether we anticipate getting into some kind of book review at this level to make some recommendations. My answer at the moment is that I am very doubtful.

Q. Have you seen these/any materials?

A. *(Torgunrud)* No, I have not, and I don't think you have either, Gerry, nor have any of our committees. I feel, however, that we are just on the verge of getting into some of the things that we will return to in our gathering-up session this afternoon at 1:30 and 3:30, and we have run past our time to get into groups. So may I suggest that, unless there are some questions relative to how the groups are to operate, that these other kinds of comments, I am not suggesting that we terminate them because they are unimportant, but that they can be returned to this afternoon when we have our plenary sessions.

Q. I am wondering, after the report has been filed, will delegates receive a copy of that finished report?

A. Yes.

GROUP REPORTS

Tom Kieren - Report on the activities of Groups A_1 and A_4 which dealt with teacher preservice and in-service

Briefly, we were asked to deal with four questions. The first is, which teachers need in-service training; the second, what are the different kinds of programs needed; third, what are the dimensions of the programming with respect to the province, that is, who should be responsible for what kinds of activities; and the fourth was the cost.

Neither of the groups that I sat in dealt very greatly on the magnitude of the cost, but, however, some comments on the cost do come up.

To suggest that there are two different kinds of discussions going on in the two sessions that I was involved with, and Ken Bride was involved in, I will report separately on the two sessions for question number 3. I will try to summarize the reactions of the first two.

With respect to the first question, it was felt that all teachers needed in-service. This was especially true for rural areas where teachers served in a variety of staffing positions. They may not be only teaching two classes of English, three of social studies, but also one of mathematics, etc. A second consideration here was the concomitant need for parent education, where parents are seen in the role of teachers as well. With respect to the variety of in-service, clearly there is a different need for people who are more or less directly responsible for teaching and teaching measurements and its utilization, that is, priority must be given to mathematics, science, perhaps industrial and vocational education teachers, home economic teachers, etc. So they need one form of in-service and/or preservice programs. The rest of the teachers need to be in-serviced with the aim of providing a metric climate in the school, or making the school an institution where metric units are lingual practice, if you will.

With respect to the dimensions of the program, I will refer to session one. Because of the commonality of need some central leadership was seen as useful. The department could provide a charge to the profession, but the profession would be the central leader in providing in-service for teachers. Again, let me reiterate that the profession, that is The Alberta Teachers' Association, perhaps, and its various councils would provide the active leadership in providing for in-service. Further, the teachers at the local level would then respond by activating and designing local programs, calling on the leadership from the profession at large. The University and the Department of Education could provide personnel resources and other forms of resources to help, but the leadership role was seen in the profession.

There was no consistent feeling as to the time constraint on the provision for this in-service program, but it was felt that some leadership was needed here.

With respect to group two, they saw a stronger role for the department along these lines. The department should provide a time frame for in-service programs; that is, what are the earliest and latest dates for some kind of complete implementation of the program; second, basic guidelines for the kinds of materials to be covered so that, in fact, there was uniformity in the implementation in the schools of SI units and instruction towards this end. Third, the department could provide a set of resources - kits, videotapes such as Dr. Lindstedt's of yesterday, and a list of available resource personnel. Fourth, provide a coordinating service in providing a clearing house for various materials used in the province and secondly, to coordinate the effort so that each local school board would not be re-inventing the wheel in providing the in-service at that level.

A major consideration in session A-4 was the cost. What is the major cost? Both sessions felt that the major cost was in terms of teacher time and effort to 'tool up' if you will. There were two minds as to who should bear this cost. One view was that it is simply a part of the teacher's job to update himself, and hence the profession at large and teachers individually bear the major cost. The second view was that this is a new societal demand and hence special provision such as release time or special in-service programming on a release time basis should be made.

S. Simonson - Report on curriculum and implications of conversion to the metric system on curriculum materials (Groups B_1 & B_4)

It wasn't too easy to hold right to that particular topic because of course it spilled over into the preparation of teachers for the handling of the curriculum materials, the cost of these materials, and so on. So we did talk about many items related to curriculum.

One thing that kept coming through, and you have already heard it, was the question of timelines, guidelines, time-leads and so forth, indicating that the members of the group felt that there was a necessity for direction on when these things are to take place and this matter of direction would come from the federal government, certainly from the provincial government, from the Curriculum Branch, and so forth. That the school, as such, cannot select this matter of guidelines or the timelines that we referred to; there has to be direction in this regard.

It was felt that the Department of Education must initiate the establishment of guidelines including dates for the implementation of the metric system. The change is already in progress, as indicated by the changes that have occurred in physics, chemistry and various sections of the science programs and texts in recent years. So, this has already happened and is just a matter of extension.

Again, the Department must next develop curriculum guides and programs of studies that emphasize the changes that are required. These guides must cover all subject areas and not just the areas of mathematics and science, because the metric system is going to be felt throughout the social studies programs and so on. You have maps, you have globes, and you have many materials that are related there.

There is the question of terminology that has to be used throughout other subject areas. The Department of Education must be prepared to develop and perhaps provide interim materials and supplementary materials to assist in the early years of the new program. We were not too sure that we could just go out into the market and say, "Here is a book that will serve our needs". There will have to be direction in the matter of selection and perhaps in the matter of interim materials because changes may occur insofar as the directions in curriculum, whether it is on, as we were talking about, the new math emphasis, or whether there is a re-emphasis on the basics. It would not be good to make a selection of texts that emphasize the metric system and perhaps the new math approach and then in the matter of two or three years' time the emphasis is to be on the basics.

Timelines must be set out by the department. Grades 1 to 6, for instance, in September 1974 perhaps and then phase-in the other grades so that the change is complete over a period of five years. One group suggested a phasing-in period of five years. Another did not want to limit it to five years and talked in terms of the United States program, indicating 1984. But so long as there is a phasing-in period that could be used, this is something that should be kept in mind.

Any timeline should provide enough lead time so that there is time for the preparation of materials. That is, it cannot be an overnight type of affair because these programs affect universities, colleges and school systems, all of them.

The groups were definite in supporting a program that will result in total immersion for the thinking of metrics rather than a program that involves conversion process.

Most members felt that if materials are carefully selected, the grade 1 to 6 levels will not experience problems in the use of the metric system. It was pointed out that the federal government has endorsed the metric system, the only unknown is the actual objectives so far as dates of implementation. The time of implementation should take into account the rate at which the change would take place in the outside world. This again comes back to the federal and provincial so far as road signs, consumer materials and we were talking about the milk containers to litres and so on, so the time implementation programs would have to take these into account.

Then, publishers should be advised as to whether changes are immersion or conversion in nature so that texts are developed on that basis.

This is something that would have to be done in the very near future so that texts are developed along those lines. And, again, this becomes a matter of government position, government policy.

We were told that boards will do what they are directed to do by the Department of Education and the Curriculum Branch. As was the case with the new math, boards apparently did not have very much choice, they made the change. The Curriculum Branch and the Department of Education recommended certain things and these things did happen. It is felt that the same thing would occur now.

Members of the group were not worried about teacher competence. The statement was made that good teachers are available and they are quite able to adapt to the new program. This is not a matter of real concern. But the pedagogical approach should be the metric thinking approach and teachers, new teachers that are being trained, should be trained along those lines.

Now, one other aspect that we dealt with was the question of cost. How expensive is this program to be? Again, it was not felt that cost would be a major factor if the program is a phased-in program. They would not be noticeable in grades 1 to 6 in any case because the materials they use, the text materials that they use, would not be that great. On the other hand, the costs would not be particularly great at the high school level insofar as physics and chemistry are concerned because the textbooks have already been geared to the metric system. Some changes, of course, would be necessary in the mathematics field. However, it was mentioned that there could be heavy costs experienced by vocational schools in courses such as industrial arts, changes in the textbooks at the senior levels, machinery that is purchased with an intended life of perhaps 20 or 30 years, and that schools of that nature might have problems.

The question of supplies such as maps and globes - this was not considered to be a serious problem. Many of these now have joint measurements on them and we can use up these materials and gradually replace them. It was felt throughout that there did not have to be complete changeover of all texts and all materials if the program is planned and is phased-in gradually.

It was also stated that we are in a metric world whether we like it or not. It is with us and we will have to adjust and we may have to spend some money just on that basis. However, the actual cost of the change to the schools was not considered to be that big a problem. Now, the Department of Education should be prepared to provide some special materials during the phase-in period of time.

One other item, and this is the last. The item of costs, and this is to government, could be the provision of services for in-service training programs for the training of teachers. This, again, is geared

to curriculum and it was felt that these should be arranged in the near future through the Curriculum Branch and Field Services Branch, and it was also felt that regional offices could provide direction and leadership in this regard. This would be an additional service that would be provided to school systems to get them ready for new programs.

E. Torgunrud - Report of Groups C_1 and C_4 which dealt with the costs of conversion

Our consultant outlined three major variables in this whole question of cost implications of conversion to the metric system.

1. The cost of teacher education
2. The whole dimension of communications
3. The printing or publishing or equipment that might be necessary in this conversion.

There were four assumptions:

1. If we assume the 1976-77 timelines, then we have a phasing-in period
2. That we have the present structures for carrying on the in-service education
3. That it is a matter of arranging the priorities
4. That it not be additive, that the in-service in metrication not be added to the other items presently going, but it appropriately find a priority place in the present structures and topics that are presently in that in-service structure.

Two forms of communication responsibility -

1. The first of these being the actual internal one that we must communicate to our teachers, to the administration, the necessary elements of the conversion to the metric system.
2. A secondary responsibility of communicating to the parent the kind of thinking that they must have and understanding the relation to the metric system so that they can understand what it is that the student, their children, are doing in school.

Some brief editorial comments:

1. what activities might be engaged,
2. what actual costs, if any, would be there, and
3. what should be the various responsibilities.

First of all, I think that there is an increased understanding of the metric system that the teaching force must acquire.

The second point, if we are dealing with the teaching competence for measurement concept, then I think we can look at this whole conversion in this fashion. If we make the assumption that teachers now have the teaching competence to handle measurement and the understanding of the system, no greater demand is being made upon them than upon any other member of society. However, they have a role to play, the school board has a role to play, and the province has a role to play.

J. Percevault - Report on Groups D_1 and D_4 which dealt with institutional role

Institutions that will be affected are obvious. The Department of Education probably with the greatest responsibility in providing leadership in implementing and organizing a timeline, school systems, post-secondary institutions, ATA, ASTA, Alberta Federation of Home & School, are all obvious.

Generally, general recommendations that came through from the group, roles for all, that all institutions can play, focus on first, planning; second, the training of the existing work force; and thirdly, scheduling for the implementation; and lastly, providing opportunity for training of adults in the non-working force.

Discussion focused on four general areas from the standpoint of institutional concern. The first was that of teacher education. And I have chosen to combine the recommendation of both groups in this presentation to the total group. First, recommendation for preservice at universities include instruction in SI in the training program of the potential teacher. The recommendation from one of the groups was that this be seriously undertaken during the academic year of 1974-75. Regarding in-service, a recommendation was that universities and other post-secondary institutions prepare courses on a credit or a non-credit basis for teachers. There was divergence between the groups, some feeling that the competency level of teachers is such that this can be done in the minimal amount of time, and concern at the opposite extreme that teachers may need a leadtime of one to two years.

The second recommendation was that professional development days be utilized to train teachers in SI. I think this is the same type of concern that has already been expressed that this become priority in the professional development days which most boards make available. It was also noted that this was also the role of school boards and of the professional organizations.

Repeating once again, there has to be a timeline. A general recommendation was that the provincial Department of Education establish

and publish a timeline for implementation of SI within the schools. Included in the timeline would be a period of time for trial and a date on which it would be effective throughout the province.

A specific recommendation from another group, still dealing with timelines, was that the metric system be tried in the schools for an experimental year, the school year of 1974-75, and that the SI be fully implemented in 1975-76, fully implemented meaning total immersion from grades 1 to 12.

The third role is to look at materials. One, the first recommendation, that the Department of Education continue to evaluate materials and recommend suitable materials to school systems. The second recommendation, that school systems be advised to stop or severely curtail the purchase of all Imperial equipment. Third recommendation, that school systems be advised that existing machine tools may be converted - this is a very specific one - to metric with a note that NAIT is prepared to offer a two-day seminar on the conversion of machine tools. This again looks at some of the costs.

The last general area was that of adult education. A recommendation was that the media be encouraged to prepare programs on SI, particularly those centres that have educational media, or educational television.

Another recommendation - post-secondary institutions offer courses on metrication for the adult public.

The last recommendation - that the professional association, The Alberta Teachers' Association, in cooperation with local adult education programs, offer courses for the general public.

W. Lencucha - Report on Groups E_1 and E_4 which look at the provision of the relevant context for students

Our first job was probably to look in terms of trying to develop a relevant context for conversion from an internal viewpoint, and I suppose we would think of internal here from the standpoint of the school itself and the children within the school. Secondly, an external one in which we go outside of the school itself, both through agencies and also what we might call or think of as our adult public.

In terms of internal development, I think we were trying to move aside from curriculum development, actual subject areas and so on, and think probably of areas where maybe in some informal way we can develop some background for introduction of metric itself. One of our people from the Edmonton Board in fact suggested that the move was

taking place. One of the ideas they had was at the present time they are converting all of their track and field which we may think of as part of the physical education program, or sometimes as an inter- or extra-mural program, converting all of the materials, all of the measurements, and so on to metric. In fact, they are going to the extent of dealing with aspects of the changeover of even crests and awards for different types of events. So this is sort of an idea of what we mean by internal.

Sort of coinciding with this, although it does not relate directly to our school system, they thought that they might look to other sport events that are taking place and we may think in this matter as the development in swim events. I think it is becoming quite prevalent if we can incorporate these. Young people will probably see some relevance or means to this type of changeover.

Similarly, from an internal viewpoint, they even brought up ideas of field trips wherein social studies, displays of consumer goods, research on consumer developments that are taking place might be useful in metric development. Or a third one might even be the fact that we have groups of students who are going overseas on special visits and so on, that many times we might be able to use these special people to bring back relevancy of metrication to us.

We moved from there to external areas and tried to develop a relevant context for conversion itself. Certain things such as the '76 Olympics coming up, summer and winter games, where metrication might aid as an agency in the development of some relevancy itself.

Lastly, within the school itself, we thought of agencies like the Alberta School Athletic Association which probably should be built-in to help create an awareness for metrication.

A second area that was moved onto was probably to really identify and involve outside agencies and I suppose to try and determine how outside agencies from the schools might be able to provide an environment both for the public and for the school itself to adjust and accept metrication. So we were thinking here, I suppose, of ways in which we can integrate and use agencies with developments within the school itself. Some examples of this, and I think they are a repeat from what we have heard in sessions, are the use of health services. We hear, of course, of the development in hospitals. We have such things operating as health units within our schools and we wonder whether the medical data that is developed on children and so on is written up in metrics and whether the data is brought home to parents.

Another area might be in terms of industry and probably this might relate more closely to areas of vocational education. Children are quite interested in engine designs, motor bikes and this type of thing where metric conversion is taking place, and probably in some way we might try to associate this with developments in school itself.

In terms of what we are attempting to do, we feel that to provide the context, I suppose, it is very essential that we go to the adults and we also go to the home, particularly, and try to develop ways in which we might promote or publicize the development of metric changeover there. A couple of illustrations were given. One lady indicated the fact that some people have learned French by studying the Kellogg packages at breakfast time. They sort of thought that perhaps with agencies of this type it might be possible to create some sort of measures using metrication to make a general awareness to the public itself.

Another illustration was the fact, and I had not heard about it but I suppose it is part of the women's operation, that apparently there is what they call a United Nations cookbook which might have some usefulness within the home, probably also within the field of home economics.

Other promotions, and we thought but did not come up with any specific recommendations, but I suppose if we were attempting to carry this over we would have to look to promotions on how to reach the people and such things as were mentioned before, through use of the various media and how we were going to incorporate them into publicizing the use of other agencies like the weather forecast that we heard during the conference, or the use of gasoline stations, might be useful.

And coming back, lastly, to the school itself. One indication came up that if we have decided or will decide to move fairly quickly, that probably educators should make use of Education Week to promote materials through the press, through displays and other agencies.

And lastly, although it may not apply, two problem areas came up in terms of schools. The home economics was one, and we can relate the home economics program to recipes and cooking at home, I suppose. They were not too sure what standards might be used there because apparently the Europeans use the weight whereas we use the volume, so some decision would have to be made in respect to that. The second problem area happened to be the vocational area insofar as how to make that appropriate. We felt that we would have to tie or relate strictly to industry to have them lead the way or set the pace for us.

M. Sillito - Report on Groups A_2 and A_3 dealing with preservice and in-service

The suggestion was that kindergarten teachers and Early Childhood Services teachers would need some immersion in the metrication bit as well as the teachers in 1 to 12. I think there was a comment or recommendation about time, timing, that the in-service work for teachers should be timed according to the reflected needs from the community or

from the students' world in which they live rather than too much lead-time because teachers are prone to learn what they have to when they have to.

We re-emphasize, I guess, the comment made by John Percevault that the in-service really needs to be carried to the public sector and the community, parents, particularly, need to be involved in metrication along with and about the same time that students become involved.

It was suggested that there was some urgency regarding curriculum material building or rewriting or whatever needs to be done, in order to provide some basic materials for the work someone has mentioned, the preparation of teachers now in training, student teachers now in-training, and the fact they would need some software to work with.

There was a recommendation growing from our group directed at, I think, the Department of Education that all ad hoc curriculum committees be continued long enough to consider the implications of metrication in the work that they are doing and in the particular curriculum package which is their assignment.

There was one question raised about the possibility or the need or the desirability of organizing in-service curriculum building materials and the task that various organizations will fulfill organizing these so as to produce some cooperative and coordinated effort both in the in-service to teachers in the preparation of materials and in the programs of various institutions.

Marshall Bye - Report of Groups B_2 and B_3 dealing with curriculum materials

We are talking now about the implications of conversion to metrication in respect to curriculum materials. It was felt that this is essentially a curriculum change, so far as we are concerned, in the schools, and we discussed whether the cost of such curricular changes should be funded as they have been in the past. On some occasions when major changes have been instituted, the provincial Department of Education has provided supplementary grants to help defray the costs involved. It was the feeling of both groups that this special funding should be provided in the case of metrication.

Also, it was pointed out that the federal government has in the past, on occasions, when it is in the interest of the country as a whole, provided special funds for certain educational projects. It was recommended that the federal government be approached to assist in costs involved in curriculum materials. One particular area of interest in

addition to mathematics and science was that of the vocational education programs.

In regard to timelines, both groups supported the stands that have been taken already that there be definite guidelines set out and datelines set out, and that the publishers and suppliers would act according to these deadlines and guidelines.

It was stressed that there must be articulation between the implementation in the educational field and implementation in other aspects of the conversion.

In reference to curriculum materials, one group felt that the mathematics text could not be translated; that is, we should not just pull out the Imperial units and substitute metric units or SI units, but rather consideration should be given to the implications in the mathematics field. In this regard, for instance, this was pointed out that the relative importance of fractions may well change in the elementary program. Secondly, it was felt that the SI system be rigidly adhered to in the changeover and that no make-do equipment or materials be brought in during the interim period, or during the transitional period. And further, both groups recommended total immersion at all grade levels; hence they did not consider comparing costs under immersion or phase-in.

W. Ede - Groups C_2 and C_3 reporting on the general cost implications of conversion

We saw two main costs in the school -

1. For instructional aids
2. For instructional materials

Then apart from the school we say two main costs here -

1. Preservice training, preparation of teachers at the university level
2. In-service education

Here we were discussing what this might cost and we considered the professional days that teachers may have in certain areas and the cost estimated for releasing all the teachers in the Province of Alberta for one day was about $1.7 million. You notice I used the decimals. Adult education was in the cost that we also found, probably the cost that would be the greatest. It was felt that likely one of the groups talked about the Olympics as being a possible way for introducing this to the nation, as it was in Australia. Perhaps this would be a good way to bring this home to adults.

We wondered about the in-service training, whether it really would be a cost of $1.7 million, as in most areas teachers are able to have in-service days with speakers coming in. They are not always an expense; sometimes outside speakers are, but the Department of Education people may be available. Some of the administrators in local areas could conduct the in-service training so we did not see that this might be as big an expense as may have been.

When replacing texts, if an area is on a rental system, books are after three to four years ready to be replaced anyway and so when the new texts were brought in, they would be the metric system texts.

We talked about Manitoba with a $120 cost figure for equipment and it was mentioned that in Toronto the figure was $60, so we really did not set any figure that we thought it would be, but only that it would be a variable amount depending probably on what teachers in different areas felt was needed in the way of equipment.

We stressed, and I think this would be the recommendation from our group, that the Department of Education should establish a guideline and a target date for a program development and initiate the development of programs, but that the local area, the local teachers and local jurisdictions would be responsible for developing it.

I think I could end with this. It was felt that developing the metric system in the school would not be a problem. It would not be a shock to students. They adapt easily and probably, as I said before, the adults would have the greatest shock.

R. E. Blumell - Report on Groups D_2 and D_3 dealing with institutional roles

There was one thing that I did note in our group - that there was very much enthusiasm and wide-ranging interest for all facets of metric education, conversion or whatever we want to call it. So I suspect that if our group is representative of the other groups at the conference here, and I have no reason to think that they are not representative, then there is wide-ranging interest and this conference will have served a very, very real purpose by going out and sparking enthusiasm, additional enthusiasm, through the province.

Very briefly our topic was the roles of educational institutions in conversion to the metric system. This is the thing we have been talking about all afternoon. Perhaps all facets of this. We had a bit of discussion as to how we might interpret educational institutions. I think we have given a fairly broad interpretation to it. I think very briefly

it would include all of the institutions associated with the Department of Education and with the Department of Advanced Education plus some other institutions, for example hospital schools and other organizations, ATA, ASTA, H&S organizations, and so on. All of these people, of course, would have some implication one way or another. I noted in one particular group there is a feeling that the Department of Education should take a measure of leadership to give direction relative to time, materials and things like this, whether it is the production of materials or the setting of guidelines, give some overall direction.

I noted also that there was a feeling that there should be some very, very wide publicity given to the whole question of conversion here. We had one of the gentlemen from the Government of Alberta on the provincial inter-departmental coordinating committee and there was a feeling that rather wide publicity should be given to the work of this committee and the things they are doing so that we can bring these people all together. I heard the word "coordination" used a great deal. I heard the word "articulation" used a great deal, and so I suspect that people feel that we had better get together on the things we are doing and that we do not get on our horses and ride off in all directions at the same time.

W. Hryciuk - with the Report for Groups E_2 and E_3 dealing with the provision of a relevant context for conversion to the metric system

First of all, we came up with suggestions. They were not recommendations as we did not feel that strongly about them. We suggested that we might begin in selected areas and it has already been mentioned, the whole area of sport, also automobile travel, you know, the mileage - not mileage, distance and velocity. Here there was a little dissension in that last part. Again, a suggestion that we might seek and use materials employing both metric and British units now before the conversion actually takes place. And a third suggestion, that we exercise care so as not to prepare students if, in fact, the public is not being prepared as well, at the same time.

An observation, and it has also been already raised - that we will have three groups likely to deal with - the young with which there will be no problem, an intermediate group which will be some problem, and us, the adult group, where there will be the greatest problem.

We have five recommendations:

1. We need an authority (and we chose the word purposely) - we need a national authority which will take the responsibility for coordinating, guiding and scheduling the change.

2. That school, home and community be involved in education of its people at the same time, simultaneously.
3. All teachers take part in special in-service work since these people occupy special positions.
4. All educational institutions should have a compulsory course on metrication beginning now.
5. SI units - let us refer to them always and use them, and not just metric.

Questions from the floor after Reports

Q. Do you think at this time it is appropriate to make an additional recommendation from the floor or after the panel is over?

A. I think the time is appropriate now to make an additional recommendation from the floor.

I realize that this body cannot make a bonafide motion, but I believe this group could probably make a recommendation to government.

> I move that the delegates present a recommendation that the Department of Education establish a task force on metrication to study and recommend timelines for implementation approaches that might be followed by the various agencies accompanied by recommendations for allocation of same, roles and responsibilities of various agencies, task force would be another matter.

In other words, what I am suggesting is that we have a very good overview in the last two days and now somebody has got to get down to brass tacks and probably representatives from the various agencies of the province to constitute the task force to make specific recommendations to the Minister or the government.

(Hawley) - Thank you very much for the recommendation. I think it is one that is highly appropriate and will be given due consideration and we welcome comments on it as well as other matters.

Q. I think it is important that we continue from here because we had two hours of input out of a 16-hour conference and the input seems to be relatively significant. I think it should be carried on from here and the task force is the way to go about doing it.

A. Might I comment. As I said at the beginning of the conference, and other people have said as well, one of the major purposes of

this conference was to provide an awareness. The other was to provide some initial input and to help the Department of Education in going from here to the type of thing that you are suggesting and, again, a very appropriate remark.

Q. Do you know if the media was aware that this conference was going on today, and were they invited?

A. They were not here, but they were aware of it, although it was not planned that they should be here simply because this is a conference which was sort of to set the stage for the planning process and it was anticipated that having a strong public affairs or media component at this time would raise expectations for action by the government and by school systems which would not be forthcoming. I think the time for the public or very visible activity is down the road a bit.

Q. Will this report that comes out, will that be made public?

A. I expect that it probably will be. It will be available publicly.

Q. First of all, I would like to thank the Department of Education for being here and having a total immersion in the metric system in the past two days. I have found it very enjoyable.

The other point is, will the things that came up in the past two days, how much of what we have aimed at is going to be implemented through the Department of Education?

A. Thank you very much for your comment, and in relation to your question I think that one of the major tasks we have following the conference is in fact to seriously consider implications for future action, and I can assure you that there will be a relatively large measure of action taken with respect to it. It is anybody's guess as to what the final policies and activities will be at this time.

Q. Yes, Mr. Chairman, a wise person once said, "If you can't find anybody to do it, then you establish a committee". I think that the motion that was made is quite indicative of what is going on concerning establishment of committees. The federal government should do it, the provincial government should do it, everybody else should do it except the educational system. So perhaps it is a good idea to establish a task force.

Q. This task force, is it a metrication task force, or an overall task force?

A. I am sure that it is an educational task force - that has been suggested. Is that not correct? I was thinking that a group such as this cannot get down to the specifics of detail. For one thing that is getting aside its work. It would have to have a predominance of educators in it for obvious reasons - they are actually not political people, but certainly with representation of other bodies. I was thinking about what the gentleman at the back suggested, that we sit down, set it up and get moving because there is no point in philosophizing. But it is clearly to take care of the educators' concern and aspects of the problem.

Q. Obviously the school has to be concerned with what is going to happen - timelines, costs, and so on.

A. I know the things that have been said by other people, but I would much rather see an actual program coming out of this than to see an elaborate report of the proceedings. I think we have talked enough about the past and the worries of the future. I think that we are ready to move into the future but it does require a bold step. I am concerned that we have spent a lot of time and energy telling ourselves things that we already believe and are not really bearing down on the next step which calls for the type of planning that will anticipate the needs, and I don't particularly want to be involved in following-up on something, that our communities tell us, that education is not fulfilling its responsibilities.

Q. Mr. Chairman, I think that results of the discussions that have transpired here both in group sessions and at this particular juncture, that the representatives of the various groups - education, public, industry, university, and so forth, have given a pretty firm indication to representatives of the Department that we want to get something going, and the suggestion of a task force is practically the suggestion that you get something going. I would ask the chair to accept that recommendation and set up a structure to get on with the task.

A. There has been a paper prepared with respect to the beginnings of the Department of Education's position on the subject of conversion to the metric system. In that paper one of the recommendations, or alternatives for action, is, in fact, the provincial task force. That paper is being considered by senior officials of the Department at this time and therefore activity is underway with respect to making a decision on whether or not a task force might be established. So, it is not something that has not been considered

or is not under consideration, and it is something that could be decided on reasonably quickly, and if the decision were positive, implemented as well reasonably quickly. It is not all out of line with the thinking presently within at least some parts of the Department of Education.

(Torgunrud) - I would like to say two things. Certainly that we would respect and welcome a voice from this conference relative to this particular motion that has been put forward. I have listened to it as a motion on which you would like to see some expression of consensus one way or another from this group. And certainly I think we would honour this request and appreciate hearing about it. However, abandoning then the process of seconding such a motion, I would like to personally speak to it not at great length. My suggestion is, although if this conference gives us a recommendation of another structure, I would raise the question of how long can our society tolerate the growth concept while we ignore the death part of that cycle. I think if we look about in nature, yes, there is growth, but there is also death and I personally have reached the point in my professional life, and I do not think it is just old age because I have young children who can still keep me on the move, but if we move with the additional structure as a means, and I see a task force being an additional structure, that then is one more body that some already busy people are going to have to relate to. And so, I would ask you as you think about this motion that there is another alternative and that is to sensitize existing structures to new priorities. Now I do not offer that comment by way of speaking necessarily aginst the motion. It may, in fact, be necessary that we have an occasion in which a new task force is needed but I do introduce it as an additional concept in which you weigh that decision in terms of what is the total pattern of life in which we are living.

(Hawley) - Thank you very much, Gene, and I think I would have to also say that my remarks were that this is one alternative being considered and I think that Gene's comments are highly appropriate since I find myself in the same context as he does and that is that even existing structures are pretty hard to get involved in at some periods of time.

Q. Perhaps what we are doing here is two things - the administrative device and the objective. I think the objective is to get some action.

Q. I would like to know what agencies are there and how they could be sensitized so that we would see some leadership. As you suggested, maybe there is a better way to sensitize other agencies but I do not know who would do it.

A. There are some that are represented here as far as our external agencies which carry on their own programs and who work them into their regular routines. The other is the current structure of the Curriculum Branch committees and ad hoc committees which can take the concept and implications of conversion to metric and work them into their regular operations. The same is true of educational institutions and the way they regularly operate.

(Bride) - I would like to comment very briefly in support of the recommendation or motion, or whatever it is. My concept of working at the planning stage of this conference and at these sessions in the last two days would bring together a number of people throughout the province that were vitally concerned and interested with that particular problem. We have this here. These are the people who are, let's say, at the critical level here. If you want to make a change, these are the people who can do it, who are involved. I am not against Dr Torgunrud's suggestion to sensitize groups, but I don't know why you need to do that. My suggestion is that I do not think that we have an agency to carry through. I am not aware of one. To carry through with the task that is being hoisted upon the schools, and so my suggestion is that a group representative of the agencies and organizations here be considered to take on the task of further study and making specific recommendations to the government - an advisory committee on metrication. We do not have that at the present time. At least, not one that is representative of the various interests which are here.

A. I think perhaps it would be in order, although as it was suggested earlier it is not within the jurisdiction of this group to make decisions, but in order to get an expression of opinion of this group consensus to act upon that motion in terms of establishment of what might be termed a task force or advisory committee on conversion to the metric system and put it forward as a motion and get a vote on it from those in attendance so that we have something to go on. I would, therefore, entertain for a short time comments with respect to this question of the establishment of a task forcee.

Q. I feel that every time you set up a task force it is kind of a delaying action because after all it is going to be a political decision. I have just finished acting on a committee that was set up for school insurance and I think that in the end the politicians are going to make the decision regardless of what the recommendation of the task force. I think we have the feeling unanimously of all of this group to get on with the job and I am wondering what good a task force is going to do at this time. Until such time as the politicians make up their minds that they are going to move, and most certainly the indications are from this group that it is about time they move, then I do not see the necessity of a task force.

A. Thank you very much. I won't comment on these at the present time but wait until after the vote.

Q. As representative of H&S I think we have an obligation to go back to our people and ask what they think before we vote on any type of issue here. I think it might be premature.

A. I think what we want at this time is not a view of an organization but simply a personal indication, with no strings attached, about the feelings of people in attendance at this time and that is how we would treat it, and if you don't wish to vote on that basis then I suppose you could abstain.

Q. The question is, who is going to be responsible because there are all kinds of people involved and I think the specific point the representative from the school board is making is that all bodies would be represented on this whatever you want to call it, but there should be someone, somebody who is responsible and my question to Dr. Torgunrud is who would he foresee as an existing group which could assume this alternate responsibility? The problem in democracy is that we end up with no one being responsible and nothing happens and we have a helter skelter program. All I think we are saying here is that one group, some group, should be responsible for coordinating, organizing and making recommendations on this particular facet that is going to have implications for society.

A. I think at this time, since time is wearing on, that we should call the question again. I simply repeat that it is an expression of personal viewpoint by those in attendance. All those in favour of the establishment of a committee or a task force primarily to organize and implement activities, or to oversee that, would you indicate by raising your hands? All those opposed? Will those opposed keep their hands up for a minute so that we can count because there is a significant number.

I think we can go on record saying that the majority of this group favoured the motion, but there were a number of persons abstaining or voting negatively on it. We will certainly take it under advisement.

LIST OF DELEGATES

Mrs. Audrey Agar	AFHSA	B_1A_2
L.D. Anderson	CASS	B_3A_4
N.J. Andruski	Edmonton Regional Office Department of Education	C_1C_4
R.A. Bailey	ASTA	C_1A_2
Mrs. G.R. Ballhorn	AFHSA	C_1E_2
Mrs. C.J. Beattie	ASTA	D_3B_4
F.P. Begoray	CASS	A_1B_2
D. Berghofer	Department of Advanced Education	C_1D_4
R.E. Blumell	Calgary Regional Office Department of Education	D_3D_2
K. Bride	Alberta Teachers' Association	A_1A_4
A. Buffett	Indian and Northern Affairs	A_1B_2
A. Bunney	ASTA	E_3C_4
L.W. Bunyan	Calgary Separate School Board	B_1C_4
F. Burchak	CASS	A_3B_4
Mrs. S.J. Byam	AFHSA	D_1E_4
M.P. Bye	Calgary Public School Board	B_3A_2
Mrs. L. Campbell	Edmonton Public School Board	A_3C_2
G.F. Caron	Calgary Public School Board	D_3B_4
Miss C. Chapdelaine	Metric Commission, Ottawa	C_3B_4
E.J.M. Church	Department of Education	B_3D_4
Mrs. B. Clark	AFHSA	E_1C_4
L.P. Cluff	Alberta Teachers' Association	B_1D_2
J. Currie	Calgary Separate School Board	A_1D_4

Mrs. J. Davidson	AFHSA	E_3E_2
F.N. Dew	Indian and Northern Affairs	C_1E_4
D. Dewar	AFHSA	D_3B_4
J.P. Diemert	ASTA	A_3D_2
W.P. Eddy	Red Deer Regional Office Department of Education	C_3C_2
W.J. Ede	Calgary Regional Office Department of Education	C_3C_2
Miss P.M. English	Alberta Teachers' Association	B_3D_4
A.M. Fretwell	Indian and Northern Affairs	E_3B_4
F.M. Frey	Indian and Northern Affairs	D_3A_4
R.H. Gent	Indian and Northern Affairs	B_1C_4
A.A. Gibb	University of Calgary	B_1A_4
S.M. Gossage	Metric Commission, Ottawa	
W.A. Grant	Indian and Northern Affairs	E_1A_2
J. Guay	University of Lethbridge	A_3E_4
J.D. Harder	Curriculum Branch Department of Education	D_3C_4
C. Harrison	Edmonton	C_2
H.I. Hastings	Early Childhood Services Department of Education	E_1D_2
E.K. Hawkesworth	Department of Education	C_1D_2
G.B. Hawley	Curriculum Branch Department of Education	
J.S. Hrabi	Department of Education	C_3D_4
W. Hryciuk	Lethbridge Regional Office Department of Education	E_3E_2
W. Hunchak	CASS	E_3E_2
Mrs. J. Jackson	AFHSA	A_1B_2

M. Jampolsky	Alberta Teachers' Association	D_1C_4
Mrs. L. Dorothy Janzen	ASTA	D_1B_2
J.H. Jeffrey	Grande Prairie Regional Office Department of Education	B_3B_2
T.E. Kieren	University of Alberta	A_1A_4
Mrs. E. Kleven	AFHSA	B_3A_4
P.A. Lamoureux	Curriculum Branch Department of Education	C_1C_4
W.S. Lencucha	Lethbridge Regional Office Department of Education	E_1E_4
S.A. Lindstedt	University of Calgary	B_3A_4
S. Maertz	ASTA	B_1B_4
V.J. Maloney	CASS	B_1A_2
J. Marean	University of Calgary	A_1C_2
Mrs. J.M. Martin	Alberta Teachers' Association	C_3E_4
Mrs. I.C. Martini	Calgary Public School Board	E_3C_2
R.S. Melnychuk	Edmonton Public School Board	E_1B_2
W.I. Miller	Alberta Teachers' Association	D_3B_4
H. Mitchell	AFHSA	B_3A_4
W.I. Mouat	Indian and Northern Affairs	C_3D_2
L. Mowers	Indian and Northern Affairs	D_1E_2
J. Muir	Indian and Northern Affairs	A_3C_2
N. Myskiw	Edmonton Regional Office Department of Education	D_3D_2
D.R.B. McArthur	Metric Commissioner, Edmonton	
Mrs. J. McDonald	Edmonton Separate School Board	D_1E_2
K. McKinney	ASTA	B_3E_4
A.F. McLean	Alberta Teachers' Association	C_1E_2

Mrs. Lillian Orichowski	AFHSA	A_3B_4
Mrs. D.L. Page	AFHSA	C_3D_4
J. Percevault	University of Lethbridge	D_1D_4
C. Preitz	University of Alberta	C_3D_2
W.R. Prunkl	Edmonton Public School Board	C_3D_2
P.J. Quinlan	Edmonton Separate School Board	C_1A_4
J.C. Rea	ASTA	A_1D_4
W. Reese	University of Alberta	E_3A_2
Miss A. Romaniuk	Alberta Teachers' Association	E_1C_2
F. Romeike	ASTA	E_1C_2
T. Rusnack	Alberta Teachers' Association	A_3B_2
J. Ryll	AFHSA	B_3A_4
H.G. Sherk	Curriculum Branch Department of Education	E_1A_2
S. Shwetz	ASTA	B_1E_2
M.T. Sillito	Alberta Teachers' Association	A_3A_2
S.T. Simonson	Field Services Branch Department of Education	B_1B_4
Mrs. E. Stephenson	AFHSA	D_3C_2
B.L. Stringham	Field Services Branch Department of Education	C_3A_4
W.H. Sweeney	Alberta Teachers' Association	E_3B_2
M.F. Thornton	Curriculum Branch Department of Education	A_1B_2
L.W. Tolman	Curriculum Branch Department of Education	D_1D_4
E.A. Torgunrud	Curriculum Branch Department of Education	B_1C_2

M.R. Treasure	Red Deer Regional Office Department of Education	A_3A_2
L.W. Turner	Chamber of Commerce	
W. Ursulak	ASTA	C_3A_4
T. Vant	Interdepartmental Committee on Metric Conversion	D_1E_2
L.P. Voghell	Indian and Northern Affairs	B_3D_4
F. Welling	AFHSA	E_1E_4
F. Williamson	Department of Advanced Education	B_3B_2
W. Worbets	Field Services Branch Department of Education	A_1E_2

DISCUSSION GROUPS

TOPIC A - *Teacher Inservice and Preservice in Relationship to Conversion to the Metric System*

9:15 A.M.

Group A_1 Room 155

T. Kieren (Chairman)
K. Bride (Consultant)
M. Thornton
W. Worbets
F. Begoray
Mrs. J. Jackson
J. Marean
J. Currie
A. Buffett
J.C. Rea
C.J. Harrison

Group A_3 Room 155

M. Sillito (Chairman)
M. Treasure (Consultant)
F. Burchak
Mrs. L. Orichowski
J. Guay
Mrs. L. Campbell
J. Muir
J.P. Diemert
T. Rusnack

10:45 A.M.

Group A_2 Room 155

M. Sillito (Chairman)
M. Treasure (Consultant)
H. Sherk
V. Maloney
Mrs. Audrey Agar
W. Reese
M. Bye
W. Grant
R.A. Bailey

Group A_4 Room 155

T. Kieren (Chairman)
K. Bride (Consultant)
B. Stringham
H. Mitchell
A. Gibb
F. Frey
S. Lindstedt
W. Ursulak
P. Quinlan
J. Ryll
L.D. Anderson
Mrs. E. Kleven

DISCUSSION GROUPS

TOPIC B - *Implications of Conversion to the Metric System on Curriculum Materials*

9:15 A.M.

Group B_1 — Room 155

S. Simonson (Chairman)
S. Maertz (Consultant)
E. Torgunrud
L. Cluff
V. Maloney
Mrs. Audrey Agar
A. Gibb
L. Bunyan
R. Gent
S. Shwetz

Group B_3 — Room 154

F. Williamson (Chairman)
J. Jeffrey (Consultant)
E.J. Church
Miss P. English
H. Mitchell
M. Bye
L. Voghell
S. Lindstedt
K. McKinney
J. Ryll
C.D. Anderson
Mrs. E. Kleven

10:45 A.M.

Group B_2 — Room 154

F. Williamson (Chairman)
J. Jeffrey (Consultant)
M. Thornton
W. Sweeney
F. Begoray
Mrs. J. Jackson
R. Melnychuk
A. Buffett
Mrs. L. Dorothy Janzen
T. Rusnack

Group B_4 — Room 155

S. Simonson (Chairman)
S. Maertz (Consultant)
W.I. Miller
F. Burchak
Mrs. L. Orichowski
G. Caron
A. Fretwell
Miss C. Chapdelaine
Mrs. C.J. Beattie

DISCUSSION GROUPS

TOPIC C - *Cost Implications of Conversion to the Metric System*

9:15 A.M.

Group C_1 — Room 154

N.J. Andruski (Chairman)
P. Lamoureux (Consultant)
A.F. McLean
Mrs. G.R. Ballhorn
P.J. Quinlan
D. Berghofer
F. Dew
E.K. Hawkesworth
R.A. Bailey

Group C_3 — Room 131

W. Ede (Chairman)
W. Eddy (Consultant)
B. Stringham
Mrs. J. Martin
Mrs. D.L. Page
W. Prunkl
W. I. Mouat
Miss C. Chapdelaine
J.S. Hrabi
W. Ursulak
C.H. Preitz

10:45 A.M.

Group C_2 — Room 131

W. Ede (Chairman)
W. Eddy (Consultant)
E. Torgunrud
Miss A. Romaniuk
Mrs. E. Stephenson
J. Marean
Mrs. I.C. Martini
Mrs. L. Campbell
J. Muir
F. Romeike
C.J. Harrison

Group C_4 — Room 154

N.J. Andruski (Chairman)
P. Lamoureux (Consultant)
J. Harder
M. Jampolsky
Mrs. B. Clark
L.W. Bunyan
R. Gent
A. Bunney

DISCUSSION GROUPS

TOPIC D - *Roles of Educational Institutions in Conversion to the Metric System*

9:15 A.M.

Group D_1 — Room 131

J. Percevault (Chairman)
L. Tolman (Consultant)
M. Fenske
M. Jampolsky
Mrs. S.J. Byam
Mrs. J. McDonald
L. Mowers
T. Vant
Mrs. L. Dorothy Janzen

Group D_3 — Room 430

R.E. Blumell (Chairman)
N. Myskiw (Consultant)
J. Harder
W.I. Miller
Mrs. E. Stephenson
G. Caron
F. Frey
Mrs. C.J. Beattie

10:45 A.M.

Group D_2 — Room 430

R.E. Blumell (Chairman)
N. Myskiw (Consultant)
L. Cluff
Mrs. J. Davidson
W. Prunkl
W.I. Mouat
J.P. Diemert
H.I. Hastings
E.K. Hawkesworth
C.H. Preitz

Group D_4 — Room 131

J. Percevault (Chairman)
L. Tolman (Consultant)
Miss P. English
Mrs. D.L. Page
J. Currie
D. Berghofer
L. Voghell
J.C. Rea
J.S. Hrabi
E.J. Church

DISCUSSION GROUPS

TOPIC E - *Provision of a Relevant Context for Conversion to the Metric System - What Can Educational Institutions Do?*

9:15 A.M.

Group E_1 — Room 155

W. Lencucha (Chairman)
H. Welling (Consultant)
H. Sherk
Miss A. Romaniuk
Mrs. B. Clark
R. Melnychuk
W. Grant
F. Romeike
H.I. Hastings

Group E_3 — Room 430

W. Hryciuk (Chairman)
W. Hunchak (Consultant)
W. Sweeney
Mrs. J. Davidson
W. Reese
Mrs. I.C. Martini
A. Fretwell
A. Bunney

10:45 A.M.

Group E_2 — Room 430

W. Hryciuk (Chairman)
W. Hunchak (Consultant)
W. Worbets
A.F. McLean
Mrs. G.R. Ballhorn
Mrs. J. McDonald
L. Mowers
T. Vant
S. Shwetz

Group E_4 — Room 155

W. Lencucha (Chairman)
H. Welling (Consultant)
M. Fenske
Mrs. J. Martin
Mrs. S.J. Byam
J. Guay
F. Dew
K. McKinney

Date Due

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Conference report on
conversion to the
metric system